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Technical Memorandum

GLOVER ASW Initiative Sea Test SW1 XBT Data

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ABSTRACT

The most recent Glover sea trial, January/February 1991, took place at various locations on the Blake Plateau and Basin, east of Florida on the Continental shelf and rise. The three platforms participating in these trials were the USNS Glover (T-AGFF-1), the R/V Range Rover (AUTEC), and the USS Providence (SSN-719). This report summarizes the temperature/sound speed profiles measured from each platform involved in the test along with some environmental data collected at sea during that period.

(25) * Antisubmarine warfare, * Submarine detection, Sonar arrays, Sea testing, Nuclear powered submarines.

ADMINISTRATIVE INFORMATION

This report was prepared under NUSC project number A23834, Glover ASW Initiative. The principal investigator was Delia Klingbeil. The sponsor was the Naval Sea System Command PMS411. Funding was provided under program element 63553.

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INTRODUCTION

Glover SW1 trials were conducted during January/February 1991. These trials included two separate deployments referred to as T2 and T3, during the last week of January and second week of February, respectively. Figure 1 shows the overall ocean area and "box" where this test occured. Figure 2 shows a bottom contour plot of the area generated by the GEEP model (ref. 3). This memorandum provides listings and plots of the temperature/sound speed profiles measured from the three platforms involved in the test: the USNS Glover (T-AGFF-1), the R/V Range Rover (AUTEC), and the USS Providence (SSN-719). Some environmental data collected during these tests are also included.

OBJECTIVES

It was the Glover's intention to drop an XBT at the commencement (COMEX), termination (FINEX), and at the midpoint of each event. The comex XBT drop was taken about an hour before the actual comex of the event so that it could be incorporated into in-situ performance predictions and given to the shift leader prior to the start of a run.

The Range Rover's primary function was to simulate the submarine (receiver, echo repeater, beacon) as well as act as a source for studying various waveforms. Along with these objectives, the Range Rover collected environmental data in the test area. This included XBT data collection. The Range Rover was to collect XBT data at the COMEX, FINEX, and at two hour intervals during each event or as specified in the test plan. This data was to be used later for reconstruction and analysis purposes.

The Providence collected XBT data periodically during events for use in later reconstruction, modeling and analysis.

XBT DATA

USNS GLOVER

Expendable bathythermograph (XBT) temperature data were collected for the near-surface portion (0-2400 feet) of the water column at various locations during different events. Table 1 lists the XBTs taken on the Glover during SW1. The temperature profiles were entered into the Generic Sonar Model (GSM) which used the LEROY model to convert it to a Sound Speed Profile (SSP). A constant of 36.5 parts per thousand (ppt) was used for the salinity. Since this in-situ surface temperature profile (now converted to SSP) was only calculated to 2400 feet, it was then merged with the deep SSPs extracted from the historical Podeszwa data base (Ref. 1). The Podeszwa profiles for the area are shown plotted in Figure 3. The GSM (Ref. 2) was then used to produce a complete SSP plot using the CONGRATS fit submodel.

Appendix A shows the temperature profile data converted to sound speed plots and listings generated using this method. Generally, XBT data were taken prior to each event so as to have real-time in-situ sound speed-vs-depth profiles available for modeling purposes. True wind speed was measured and updated during each event. Bottom depth was extracted from the Historical Temporal Shipping (HITS) data base, which is built into the Generic Environmental Evaluation Program (GEEP, Ref. 3).

R/V RANGE ROVER

Temperature profile data were collected to depths between 100 and 750 meters using various XBT probes. At least one deep probe was used at each survey site. The data are in degrees (celsius) vs depth (meters) and not converted to a sound speed profile.

The Range Rover was equipped with an outboard XBT launcher mounted on the port rail. Data was collected by an XBT processor and transferred via RS-488 to a PC. A temperature profile was plotted on paper simultaneous to the XBT's descent. At the conclusion of the cast the data was stored on magnetic tape. Table 2 is a summary of the XBTs taken on the Range Rover during SW1. Appendix B shows the temperature profile plots recorded from the Range Rover.

USS PROVIDENCE

Table 3 show the positions and times of XBTs taken on the Providence. The plots of temperature/sound velocity are shown in Appendix C.

DIFFICULTIES

USNS GLOVER

There were several instances when the XBT fouled for unknown reasons. Perhaps the XBT wire came in contact with the RMES tow cable causing the the wire to break. There may have been some defective XBTs or the Glover may have been traveling too fast. On these occasions the cast would be repeated. Whenever possible, XBT's would be dropped while course changes were being made.

R/V RANGE ROVER

While conducting environmental surveys, the Range Rover towed a sound source. On a few occasions the tow cable to the source interfered with the XBT wire, cutting the XBT wire, and resulting in only a shallow cast. These casts were still useful for the near surface portion of the sound speed profile. High sea states during the trial caused wet decks and hazardous conditions, making some of the XBT drops difficult.

USS PROVIDENCE

There were no known equipment failures or problems taking XBTs on board the Providence. It would be desirable, however, to have more XBTs taken at shorter intervals during each event to give more accurate data analysis and reconstruction.

REFERENCES

1.) Podeszwa, E., "Sound Speed Profiles for the North Atlantic Ocean (U)", NUSC Technical Document 5447, 20 October 1976, (UNCLASSIFIED).

2.) Weinberg, H., "Generic Sonar Model (U)", NUSC Technical Document 5971D, 6 June 1985 (UNCLASSIFIED).

3.) Sonalyst Inc., "Generic Environmental Evaluation Program User's Guide", Sonalyst document MR8-0534-004, 1 December 1989.

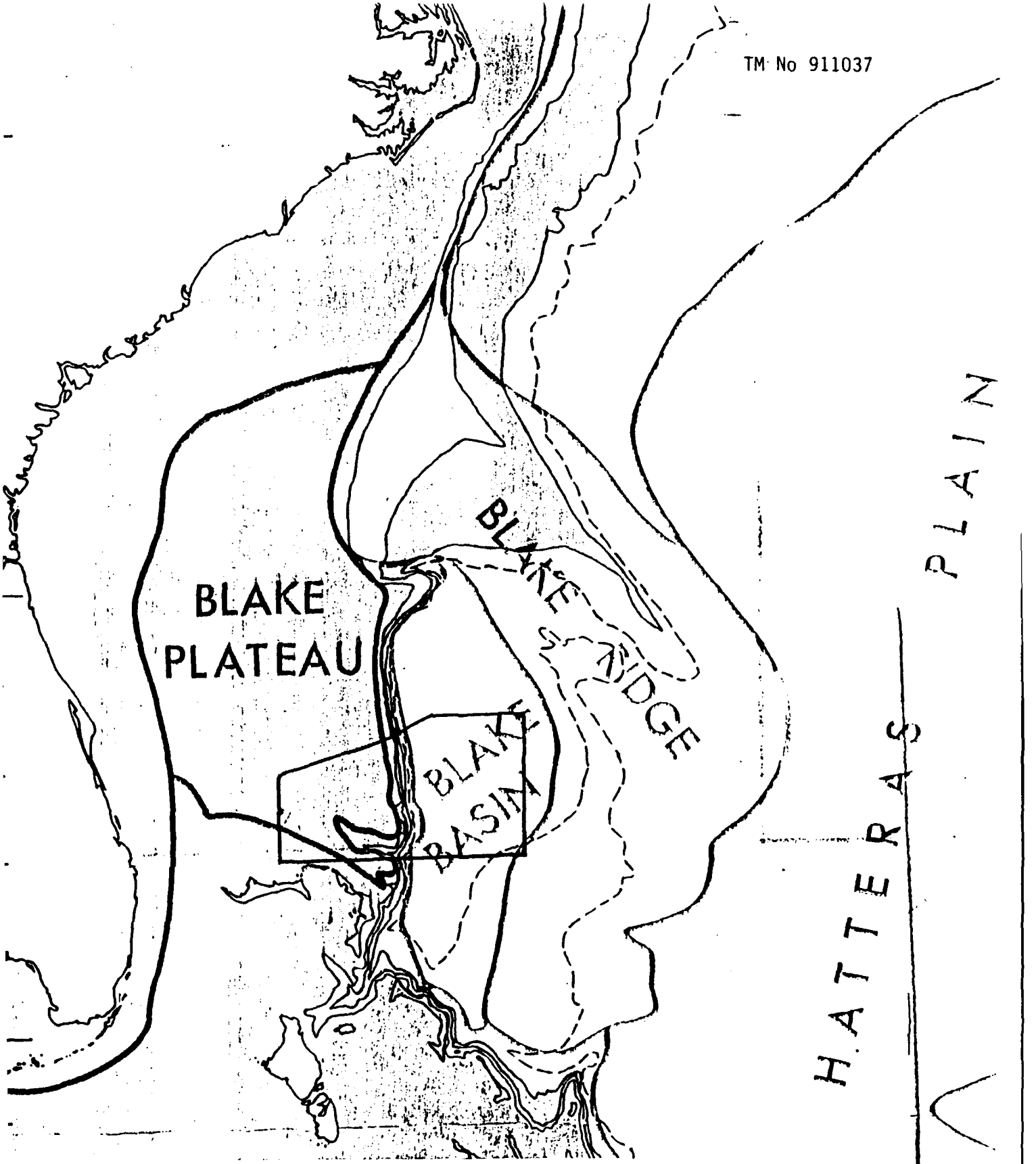


Figure 1. Test Area and Site Location

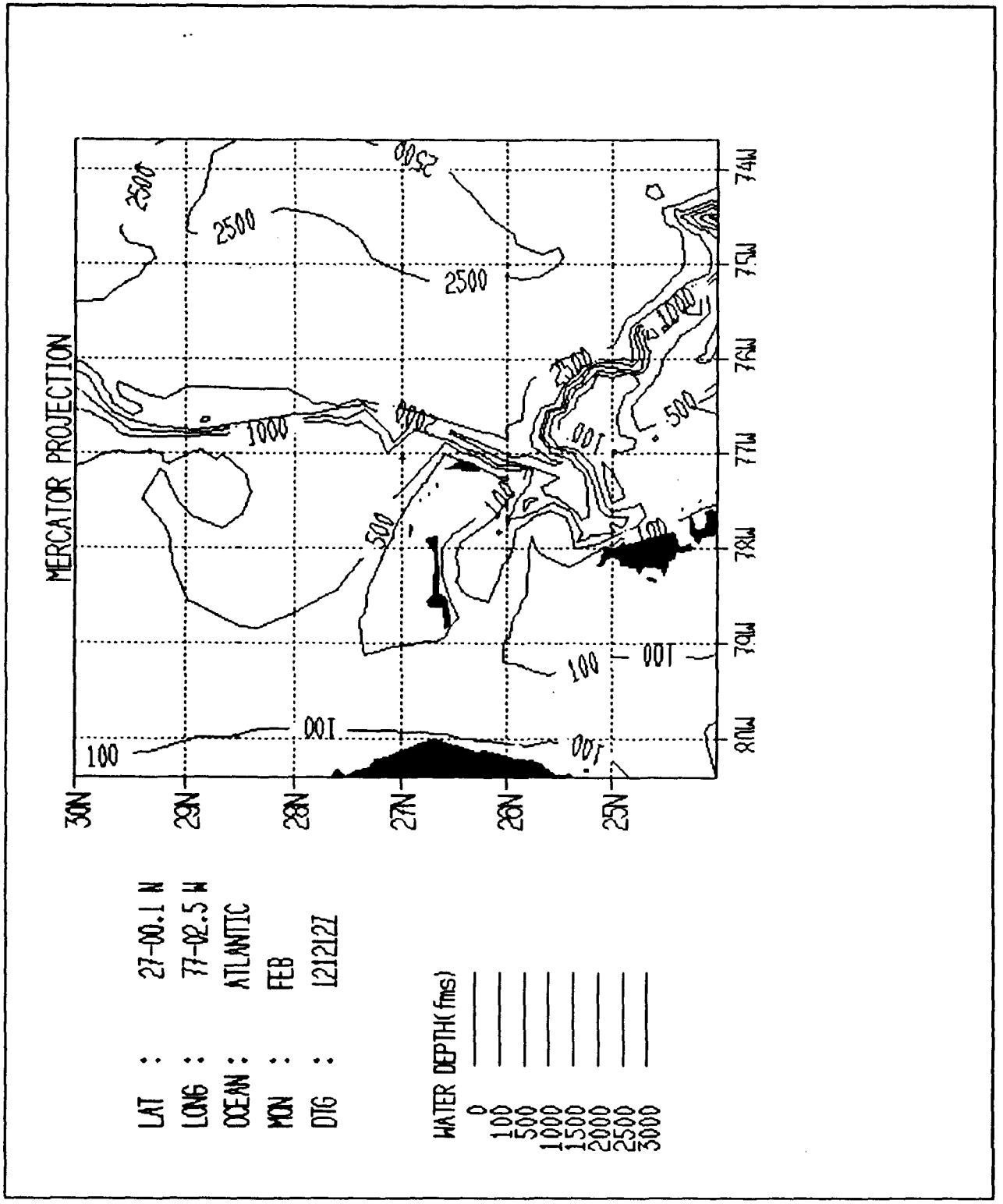
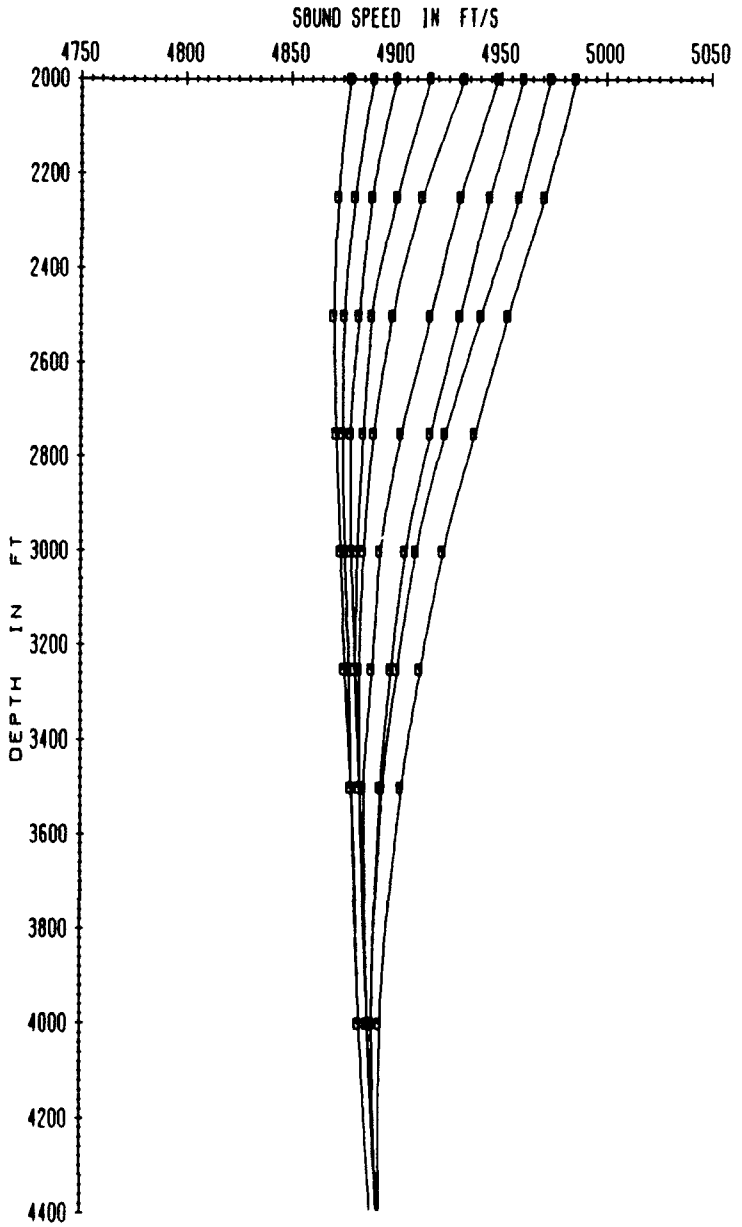


Figure 2. Bottom Characteristics Map

Figure 3. PODESZWA DEEP SOUND SPEED PROFILES
AREAS A9 THROUGH A17



XBT POSITION LATITUDE	XBT POSITION LONGITUDE	XBT TIME (ZULU)	XBT DAY (JULIAN)	BOTTOM DEP (FT)	WIND SPD (KNOTS)	MGS PROVINCE	PODESZWA DEEP FILE	XBT FILE NAME
27-56.5N	78-14.2W	1251	031	3600.	13	6	A15	G031 1251.SVP
27-49.8N	77-55.7W	1543	031	3600.	15	6	A17	G031 1543.SVP
27-53.4N	78-16.1W	1750	031	3600.	13	6	A15	G031 1750.SVP
27-04N	77-25.4W	2300	031	3600.	7	6	A17	G031 3600.SVP
27-59.5N	76-58.8W	0422	032	3900.	4	4	A16	G032 0422.SVP
28-00.4N	77-21.4W	0800	032	3900.	4	4	A16	G032 0800.SVP
27-59.4N	77-40.2W	1244	032	3800.	15	4	A17	G032 1244.SVP
27-50.4N	76-50.6W	2220	032	15660.	16	4	A16	G032 2220.SVP
27-13N	76-59W	0100	046	5400.	35	4	A16	G046 0100.SVP
27-15N	76-51.4W	0500	046	5100.	25	4	A15	G046 0500.SVP
27-45.7N	77-07.6W	0845	046	4000.	32.5	4	A16	G046 0845.SVP
27-53N	77-05.4W	1245	046	3600.	30	4	A16	G046 1245.SVP
27-41N	78-01.6W	1830	046	3600.	33	4	A16	G046 1830.SVP
27-19.4N	75-41.3W	0030	048	15650.	24	5	A16	G048 0030.SVP
27-52.5N	75-40.7W	0320	048	15600.	15	5	A16	G048 0320.SVP
27-25.9N	75-55.1W	0950	048	15400.	18	5	A16	G048 0950.SVP
28-13.6N	75-47.6W	1525	048	15400.	7	5	A16	G048 1525.SVP
28-09.2N	76-15.8W	2000	048	15000.	4	5	A16	G048 2000.SVP
28-22.2N	76-54.6W	0000	049	3800.	10	4	A16	G049 0000.SVP
28-22.7N	77-08.7W	0315	049	3600.	10	4	A16	G049 0315.SVP
28-05.9N	77-44.8W	0715	049	3600.	15.5	4	A16	G049 0715.SVP
28-44.8N	78-14.6W	1115	049	3700.	16.5	4	A15	G049 1115.SVP

TABLE 1. USNS GLOVER SW1 XBT LOG

XBT POSITION LATITUDE	LONGITUDE	XBT TIME (ZULU)	XBT DAY (JULIAN)	XBT PROBE	XBT DEPTH (M)	XBT ID #	SURFACE BUCKET TEMP (C)
27-45N	78-12W	0620	031	T-7	750.	1	24.4
27-48N	78-18W	1026	031	T-7	750.	2	24.4
27-44N	78-12W	1513	031	T-7	750.	3	24.6
27-46.7N	77-52.5W	2009	031	T-4	140.	4	24.4
27-46.7N	77-52.5W	2015	031	T-4	450.	5	24.4.
27-47N	77-03W	0139	032	T-4	450.	6	23.9
27-52N	77-05W	0524	032	T-4	125.	7	23.7
27-41N	77-34W	1005	032	T-4	450.	8	24.0
27-45.5N	77-36.8W	1317	032	T-4	450.	9	23.8
27-41.6N	76-37.5W	2216	032	T-4	450.	10	23.1
27-41.6N	76-37.5W	0203	033	T-7	210.	11	22.8
27-41.6N	76-37.5W	0211	033	T-7	350.	12	22.8

TABLE 2. R/V RANGE ROVER SW1 XBT LOG

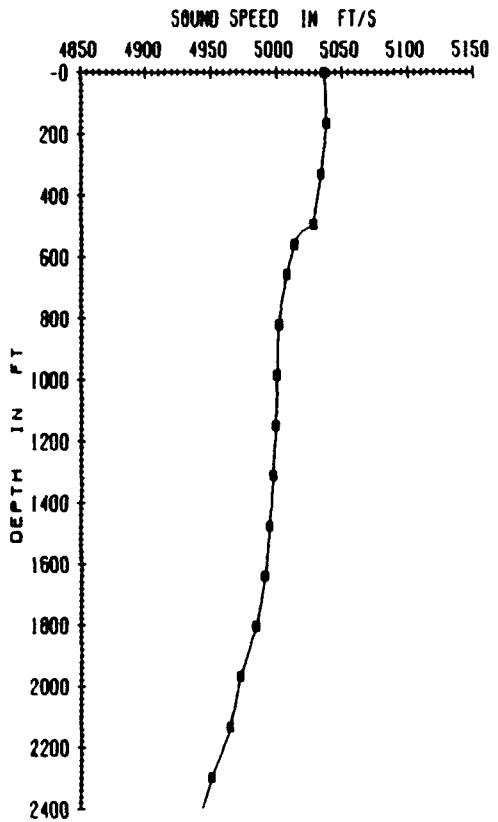
XBT POSITION LATITUDE	XBT POSITION LONGITUDE	XBT TIME (ZULU)	XBT DAY (JULIAN)
27-49.9	78-83.9W	2345	046
28-03.7N	77-10.1W	0830	047
27-59N	78-06W	1400	047
27-59N	78-06W	1425	047
28-03N	77-11W	1800	047
28-11.9N	77-11.9W	0300	049
28-05.8N	77-12.9W	1800	049

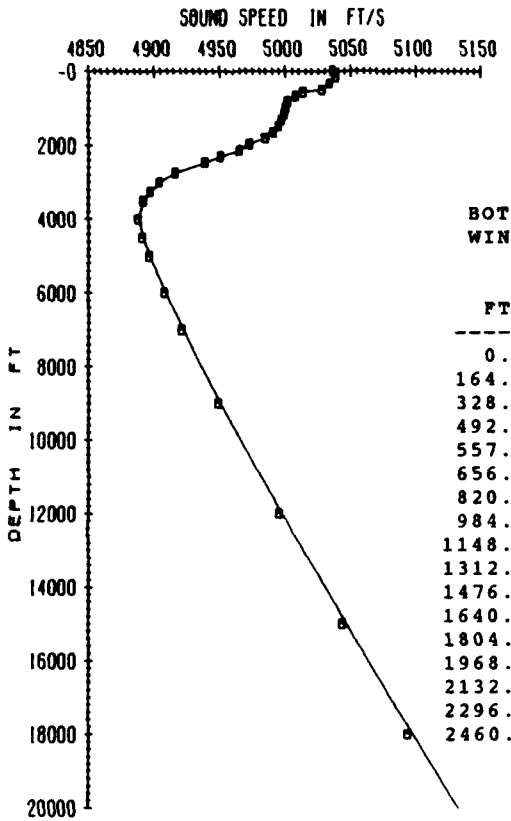
TABLE 3. USS PROVIDENCE SW1 XBT LOG

APPENDIX A

USNS Glover Converted Sound Speed Profiles

GLOVER - SOUND SPEED PROFILE
INSITU AT 1251Z DAY 031

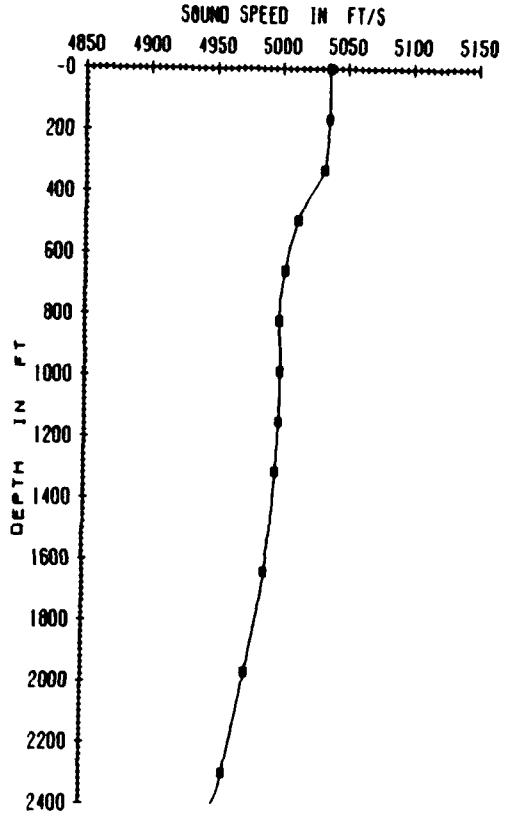


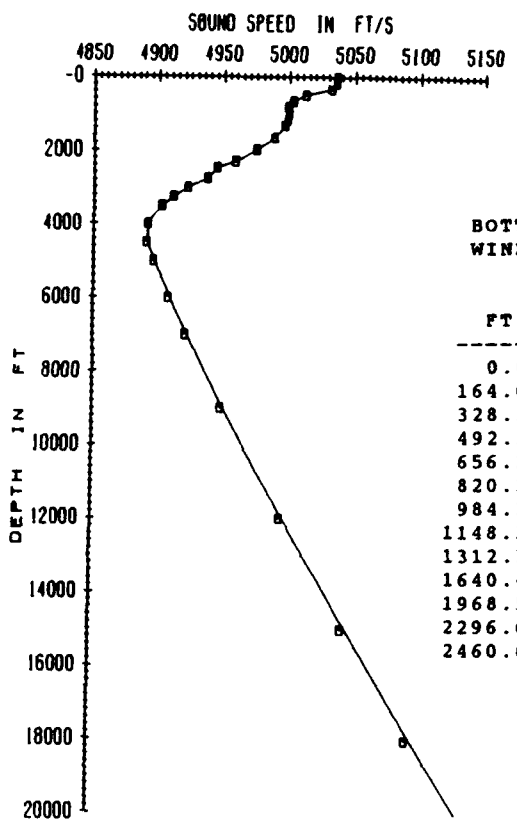


XBT POSITION : 27-56.5N, 78-14.2W
BOTTOM DEPTH = 3600. FT, BOTTOM PROVINCE = 6
WIND SPEED = 13 KNOTS, MERGED WITH PODESZWA A15

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5035.9	2750.	4916.
164.0	5037.8	3000.	4904.
328.1	5033.3	3250.	4897.
492.1	5027.7	3500.	4892.
557.7	5013.2	4000.	4888.
656.2	5007.7	4500.	4891.
820.2	5001.3	5000.	4896.
984.3	5000.2	6000.	4908.
1148.3	4999.1	7000.	4921.
1312.3	4997.1	9000.	4949.
1476.4	4994.9	12000.	4995.
1640.4	4990.7	15000.	5044.
1804.5	4984.4	18000.	5094.
1968.5	4972.5	21000.	5146.
2132.5	4964.5		
2296.6	4950.6		
2460.6	4938.4		

GLOVER - SOUND SPEED PROFILE
INSITU AT 1543Z DAY 031

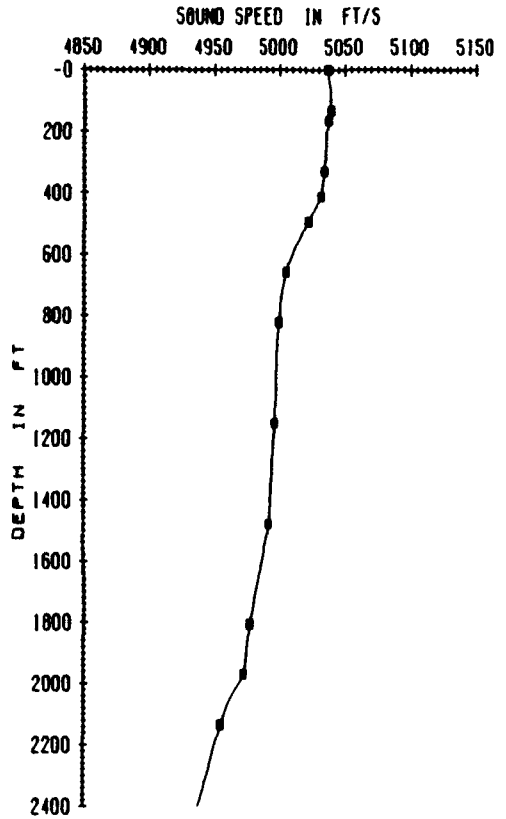


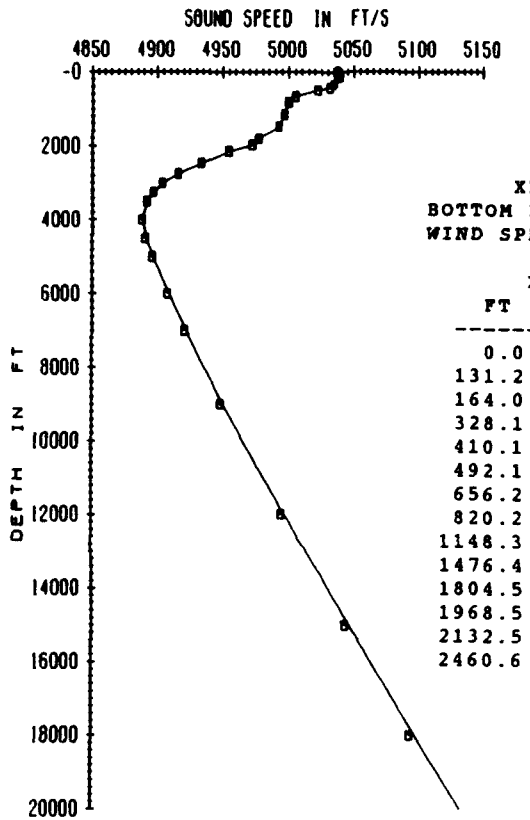


XBT POSITION : 27-49.8N, 77-55.7W
BOTTOM DEPTH = 3600. FT, BOTTOM PROVINCE = 6
WIND SPEED = 15 KNOTS, MERGED WITH PODESZWA A17

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5035.9	2750.	4937.
164.0	5035.4	3000.	4922.
328.1	5031.6	3250.	4911.
492.1	5012.2	3500.	4902.
656.2	5002.3	4000.	4892.
820.2	4998.5	4500.	4891.
984.3	4999.3	5000.	4896.
1148.3	4998.2	6000.	4908.
1312.3	4996.1	7000.	4921.
1640.4	4988.7	9000.	4949.
1968.5	4974.6	12000.	4995.
2296.6	4958.5	15000.	5044.
2460.6	4944.2	18000.	5094.
		21000.	5146.

GLOVER - SOUND SPEED PROFILE
INSITU AT 1750Z DAY 031

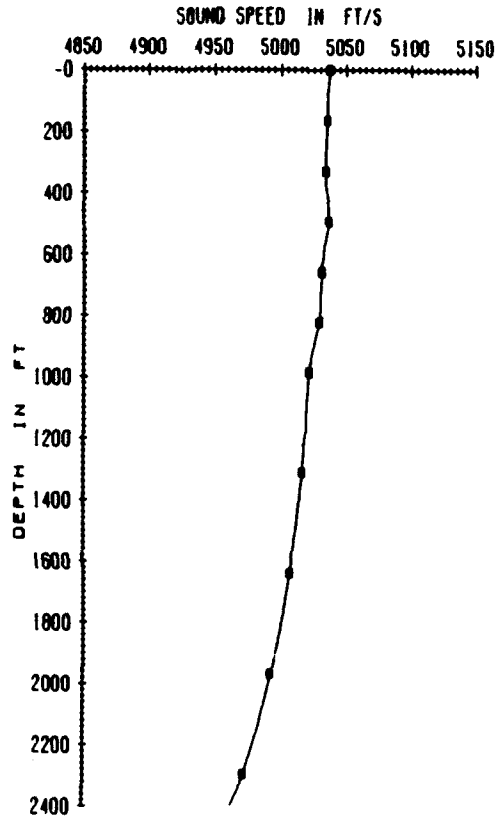


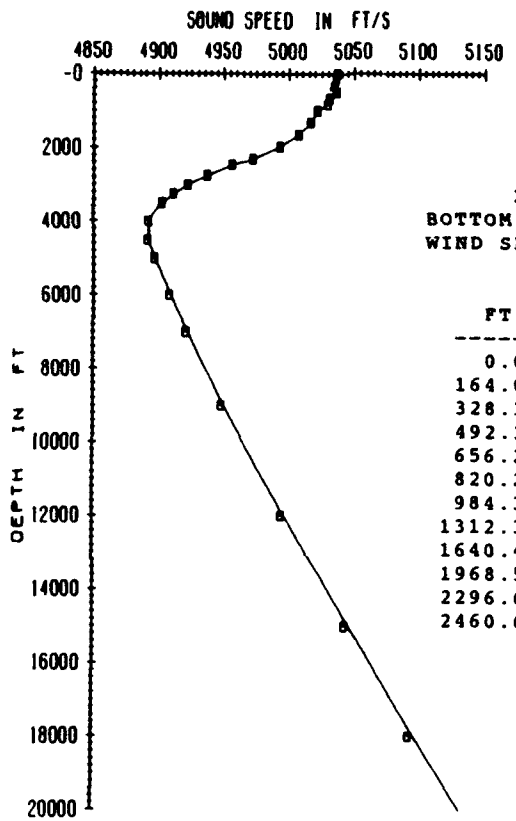


XBT POSITION : 27-53.4N, 78-16.1W
BOTTOM DEPTH = 3600. FT, BOTTOM PROVINCE = 6
WIND SPEED = 13 KNOTS, MERGED WITH PODESZWA A15

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5036.7	2750.	4916.
131.2	5038.9	3000.	4904.
164.0	5037.0	3250.	4897.
328.1	5034.1	3500.	4892.
410.1	5031.3	4000.	4888.
492.1	5021.7	4500.	4891.
656.2	5005.0	6000.	4908.
820.2	4999.4	7000.	4921.
1148.3	4996.3	9000.	4949.
1476.4	4992.0	12000.	4995.
1804.5	4977.2	15000.	5044.
1968.5	4972.5	18000.	5094
2132.5	4954.6	21000.	5146.
2460.6	4933.7		

GLOVER - SOUND SPEED PROFILE
INSITU AT 2300Z DAY 031

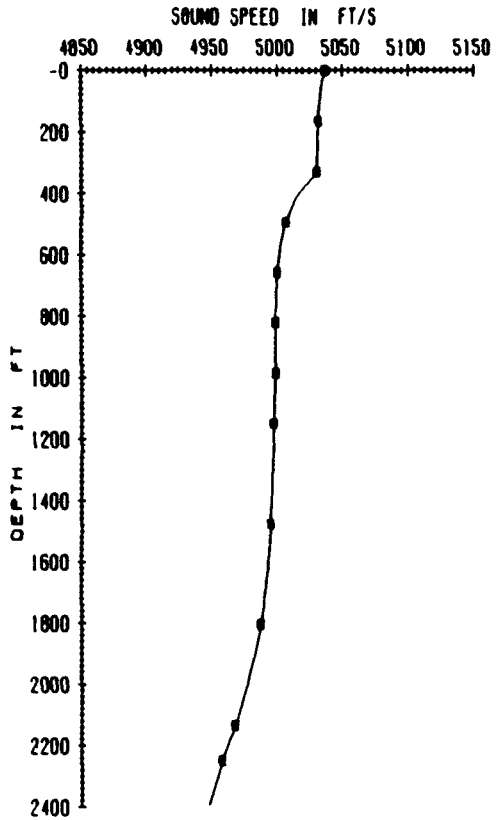


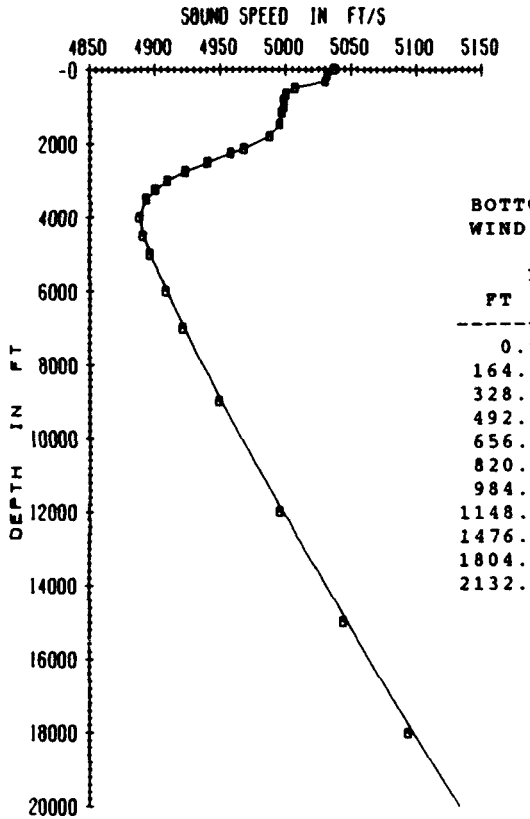


XBT POSITION : 28-004N, 77-25.4W
BOTTOM DEPTH = 3600. FT, BOTTOM PROVINCE = 6
WIND SPEED = 7 KNOTS, MERGED WITH PODESZWA A17

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5036.7	2750.	4937.
164.0	5035.4	3000.	4922.
328.1	5034.1	3250.	4911.
492.1	5036.8	3500.	4902.
656.2	5031.2	4000.	4892.
820.2	5029.7	4500.	4891.
984.3	5022.0	5000.	4896.
1312.3	5016.7	6000.	4908.
1640.4	5007.2	7000.	4921.
1968.5	4993.1	9000.	4949.
2296.6	4972.6	12000.	4995.
2460.6	4956.7	15000.	5044.
		18000.	5094.
		21000.	5146.

GLOVER - SOUND SPEED PROFILE
INSITU AT 0422Z DAY 032

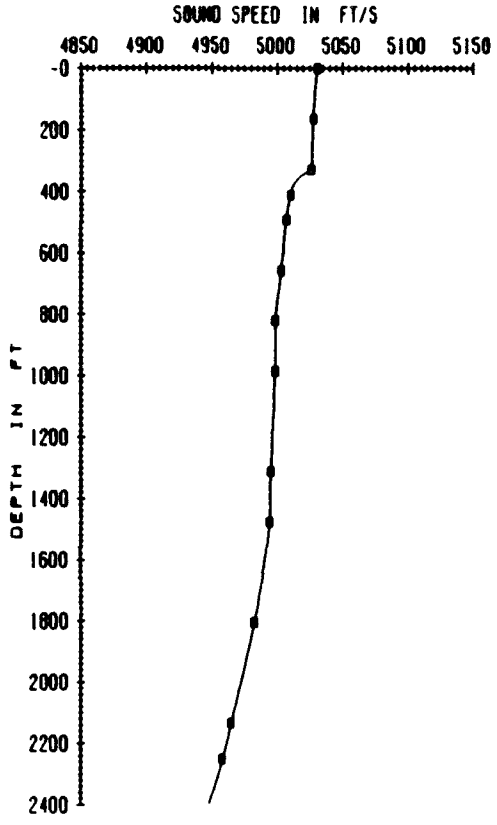


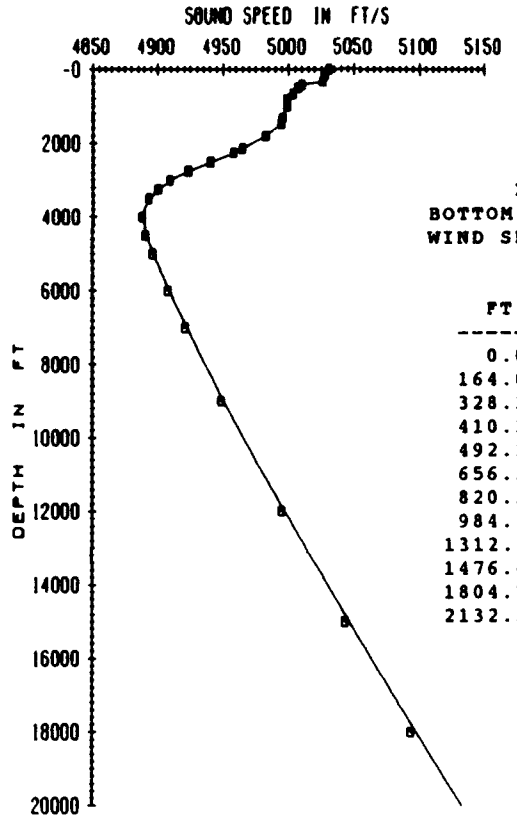


XBT POSITION : 27-59.9N, 76-58.8W
BOTTOM DEPTH = 3900. FT, BOTTOM PROVINCE = 4
WIND SPEED = 4 KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5036.7	2250.	4958.
164.0	5031.4	2500.	4940.
328.1	5030.0	2750.	4923.
492.1	5006.8	3000.	4909.
656.2	5000.4	3250.	4900.
820.2	4998.5	3500.	4893.
984.3	4998.3	4000.	4888.
1148.3	4997.2	4500.	4891.
1476.4	4994.9	5000.	4896.
1804.5	4987.4	6000.	4908.
2132.5	4967.8	7000.	4921.
		9000.	4949.
		12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

GLOVER - SOUND SPEED PROFILE
INSITU AT 0800Z DAY 032

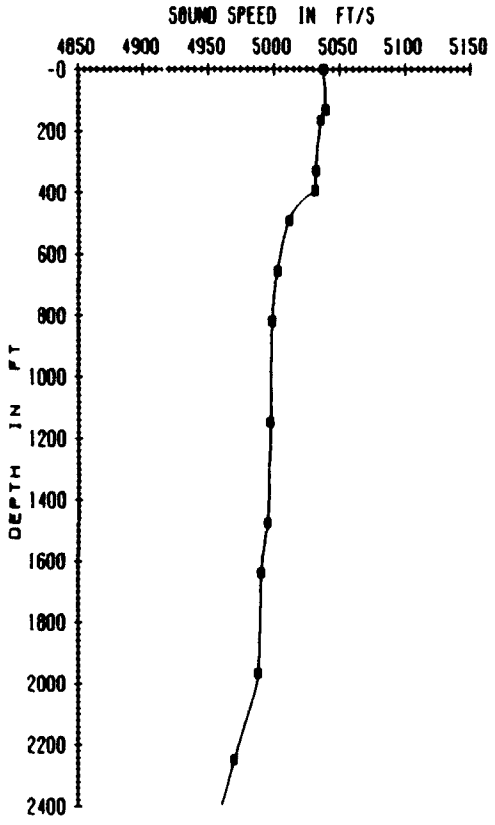


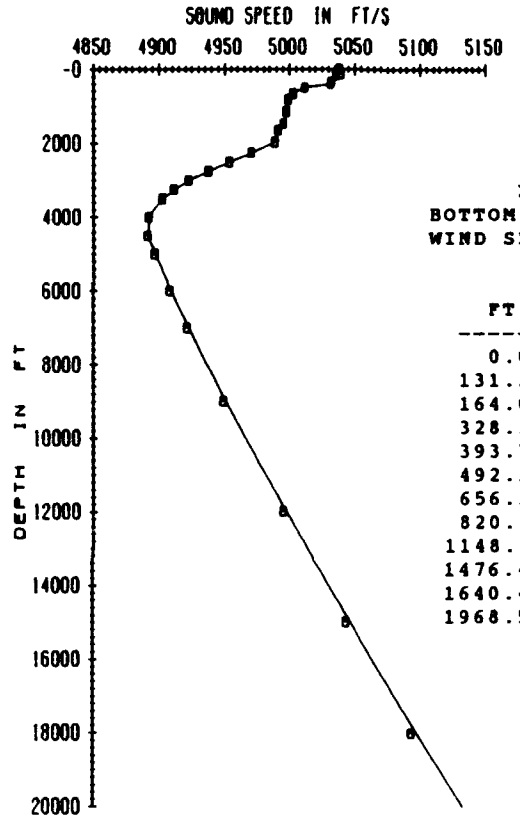


XBT POSITION : 28-00.4N, 77-21.4W
BOTTOM DEPTH = 3900. FT, BOTTOM PROVINCE = 4
WIND SPEED = 4 KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5030.3	2250.	4958.
164.0	5027.3	2500.	4940.
328.1	5025.8	2750.	4923.
410.1	5009.9	3000.	4909.
492.1	5006.8	3250.	4900.
656.2	5003.2	3500.	4893.
820.2	4998.5	4000.	4888.
984.3	4998.3	4500.	4891.
1312.3	4995.1	5000.	4896.
1476.4	4993.9	6000.	4908.
1804.5	4982.3	7000.	4921.
2132.5	4964.5	9000.	4949.
		12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

GLOVER - SOUND SPEED PROFILE
INSITU AT 1244Z DAY 032

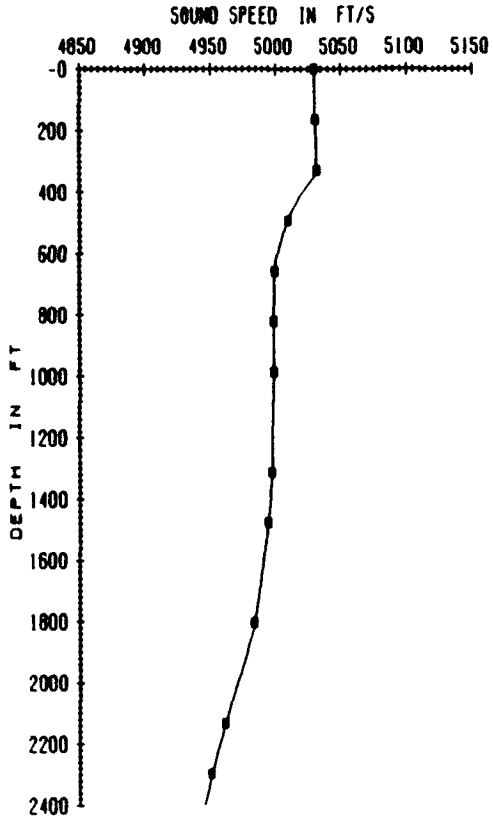


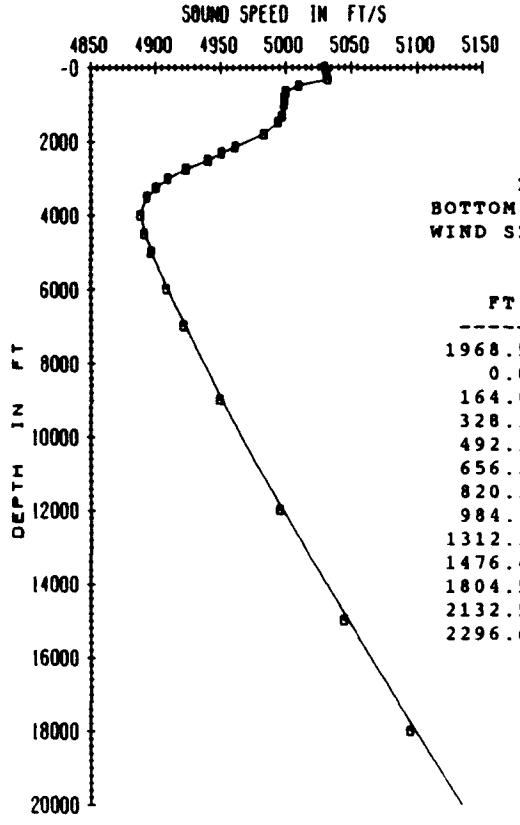


XBT POSITION : 27-59.4N, 77-40.2W
BOTTOM DEPTH = 3800. FT, BOTTOM PROVINCE = 4
WIND SPEED = 15 KNOTS, MERGED WITH PODESZWA A17

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5037.5	2250.	4970.
131.2	5038.9	2500.	4953.
164.0	5035.4	2750.	4937.
328.1	5031.6	3000.	4922.
393.7	5031.0	3250.	4911.
492.1	5011.3	3500.	4902.
656.2	5002.3	4000.	4892.
820.2	4998.5	4500.	4891.
1148.3	4997.2	5000.	4896.
1476.4	4994.9	6000.	4908.
1640.4	4990.7	7000.	4921.
1968.5	4988.1	9000.	4949.
		12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

GLOVER - SOUND SPEED PROFILE
INSITU AT 2220Z DAY 032

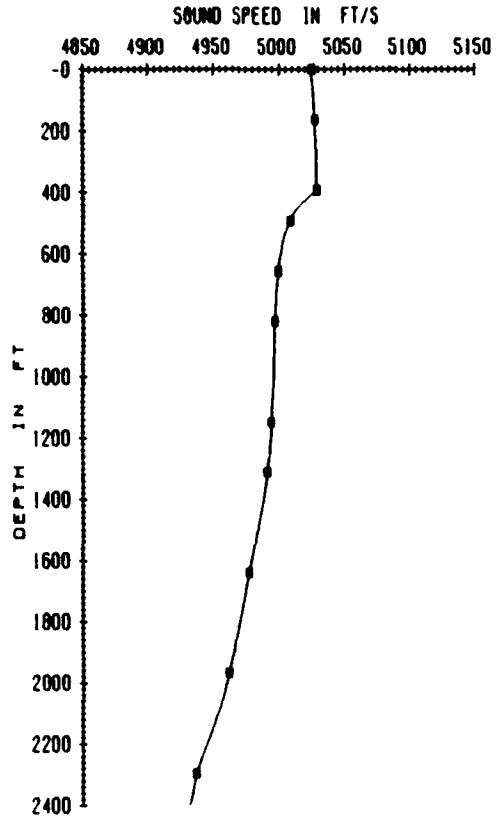


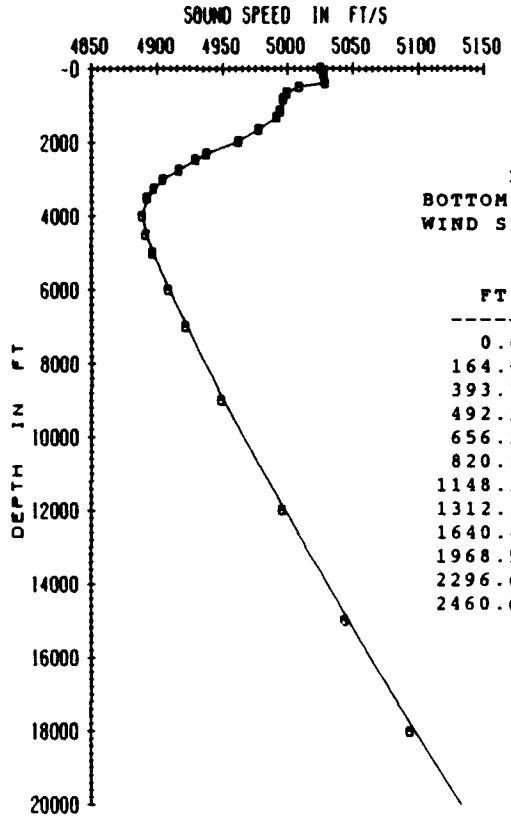


XBT POSITION : 27-50.4N, 76-50.6W
BOTTOM DEPTH = 15660. FT, BOTTOM PROVINCE = 4
WIND SPEED = 16 KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
1968.5	4988.1	9000.	4949.
0.0	5029.5	2500.	4940.
164.0	5030.6	2750.	4923.
328.1	5031.6	3000.	4909.
492.1	5009.5	3250.	4900.
656.2	4999.5	3500.	4893.
820.2	4998.5	4000.	4888.
984.3	4998.3	4500.	4891.
1312.3	4997.1	5000.	4896.
1476.4	4993.9	6000.	4908.
1804.5	4983.3	7000.	4921.
2132.5	4961.3	9000.	4949.
2296.6	4950.6	12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, GLOVER INSITU AT 0100Z DAY 046

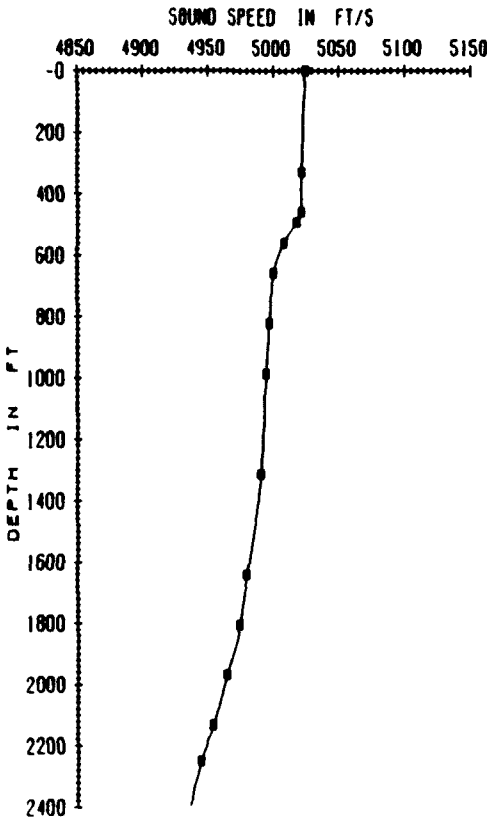


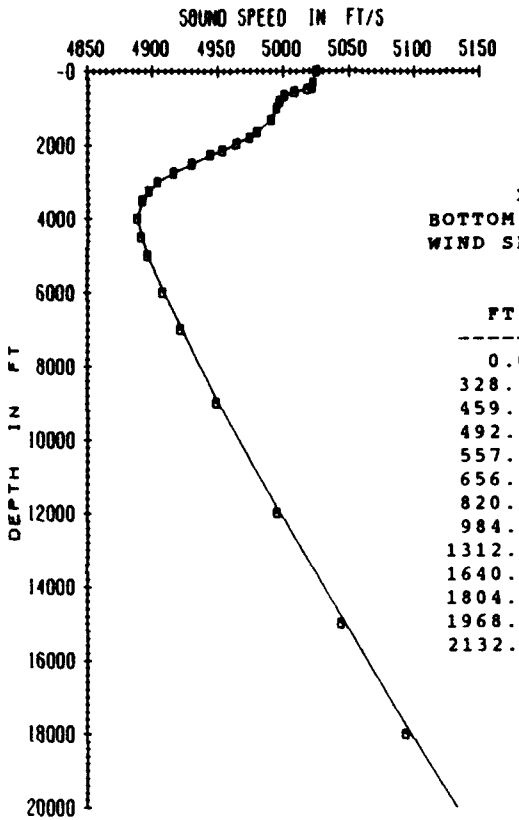


XBT POSITION : 27-13N, 76-59W
BOTTOM DEPTH = 5400. FT, BOTTOM PROVINCE = 4
WIND SPEED = 35 KNOTS, MERGED WITH PODESZWA A15

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5024.6	2750.	4916.
164.0	5027.3	3000.	4904.
393.7	5028.6	3250.	4897.
492.1	5008.6	3500.	4892.
656.2	4999.5	4000.	4888.
820.2	4996.6	4500.	4891.
1148.3	4994.4	5000.	4896.
1312.3	4991.2	6000.	4908.
1640.4	4977.6	7000.	4921.
1968.5	4961.8	9000.	4949.
2296.6	4936.9	12000.	4995.
2460.6	4929.0	15000.	5044.
		18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, CLOVER
INSITU AT 0500Z DAY 046

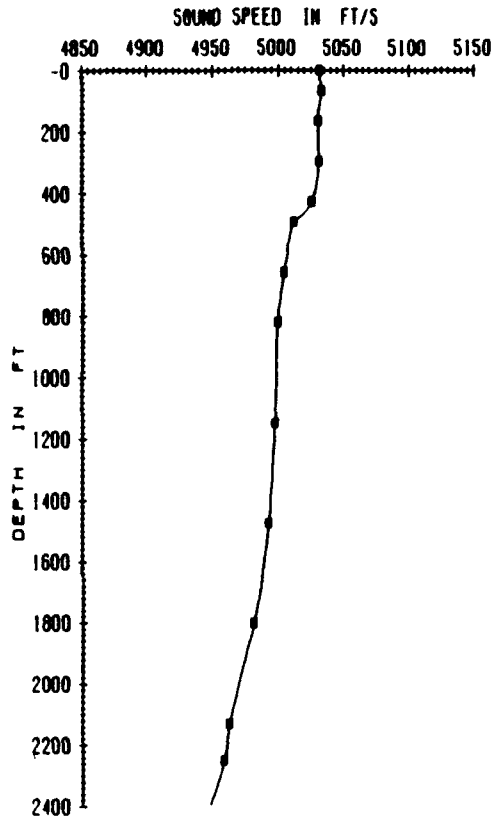


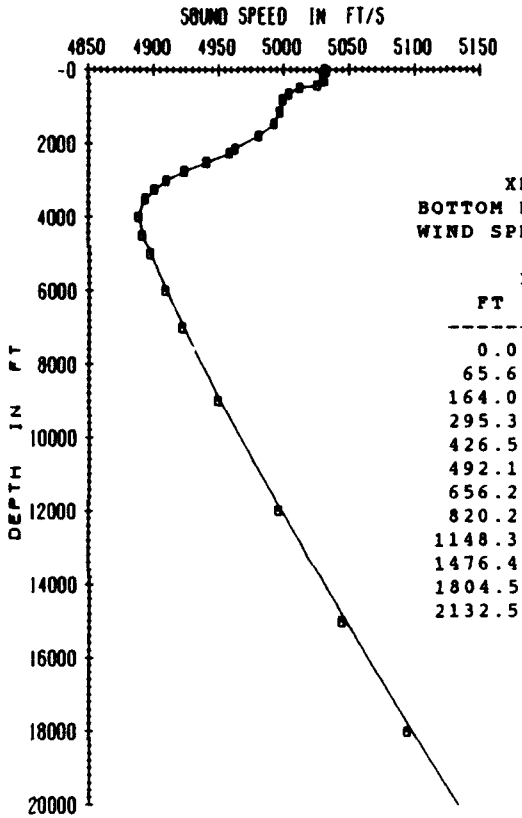


XBT POSITION : 27-15N, 76-51.4W
BOTTOM DEPTH = 5100. FT, BOTTOM PROVINCE = 4
WIND SPEED = 25 KNOTS, MERGED WITH PODESZWA A15

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5024.6	2250.	4944.
328.1	5021.6	2500.	4930.
459.3	5021.2	2750.	4916.
492.1	5017.4	3000.	4904.
557.7	5007.9	3250.	4897.
656.2	5000.4	3500.	4892.
820.2	4996.6	4000.	4888.
984.3	4994.5	4500.	4891.
1312.3	4990.3	5000.	4896.
1640.4	4979.6	6000.	4908.
1804.5	4974.0	7000.	4921.
1968.5	4964.0	9000.	4949.
2132.5	4953.5	12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, GLOVER
INSITU AT 0845Z DAY 046

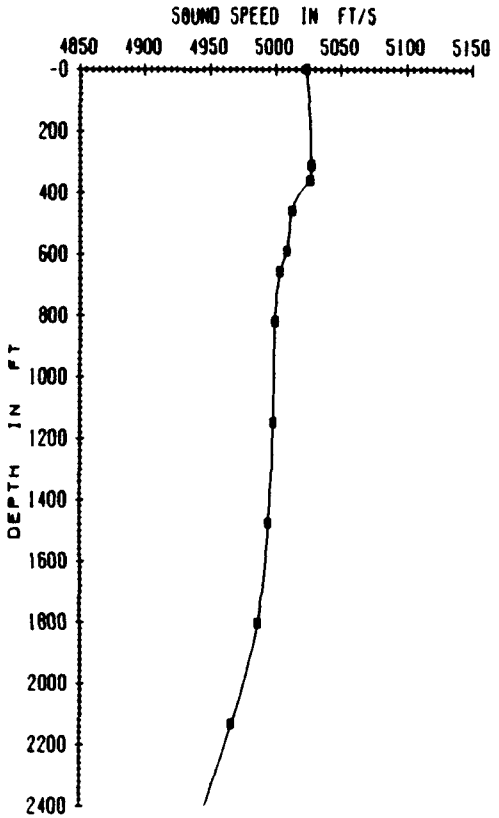


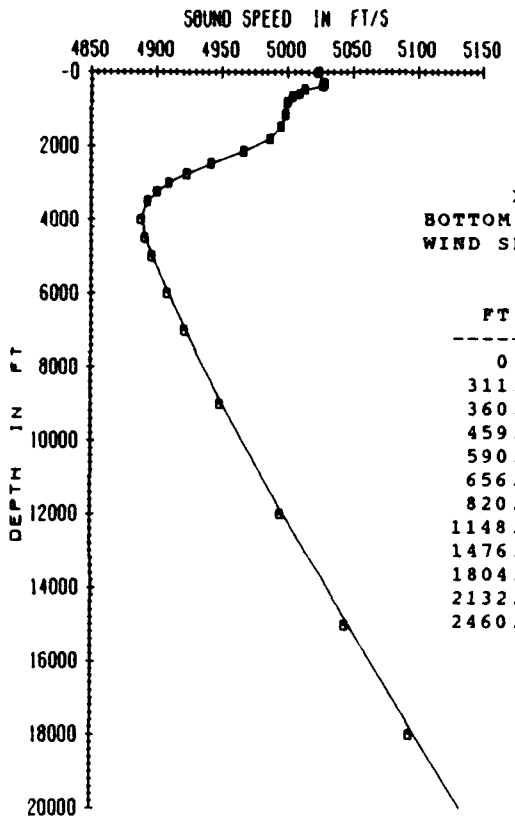


XBT POSITION : 27-45.7N, 77-07.6W
BOTTOM DEPTH = 4000. FT, BOTTOM PROVINCE = 4
WIND SPEED = 32.5 KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5031.1	2250.	4958.
65.6	5032.2	2500.	4940.
164.0	5029.7	2750.	4923.
295.3	5030.3	3000.	4909.
426.5	5024.9	3250.	4900.
492.1	5011.3	3500.	4893.
656.2	5003.2	4000.	4888.
820.2	4998.5	4500.	4891.
1148.3	4996.3	5000.	4896.
1476.4	4992.0	6000.	4908.
1804.5	4980.3	7000.	4921.
2132.5	4962.3	9000.	4949.
		12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, GLOVER INSITU AT 1245Z DAY 046

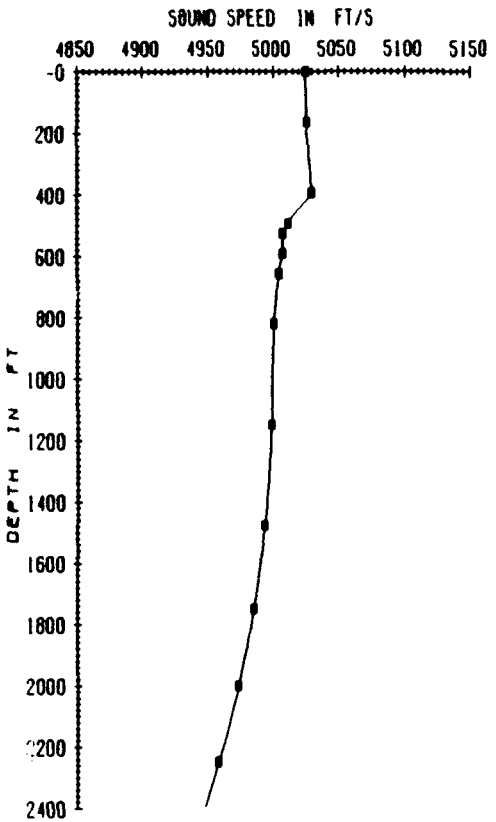


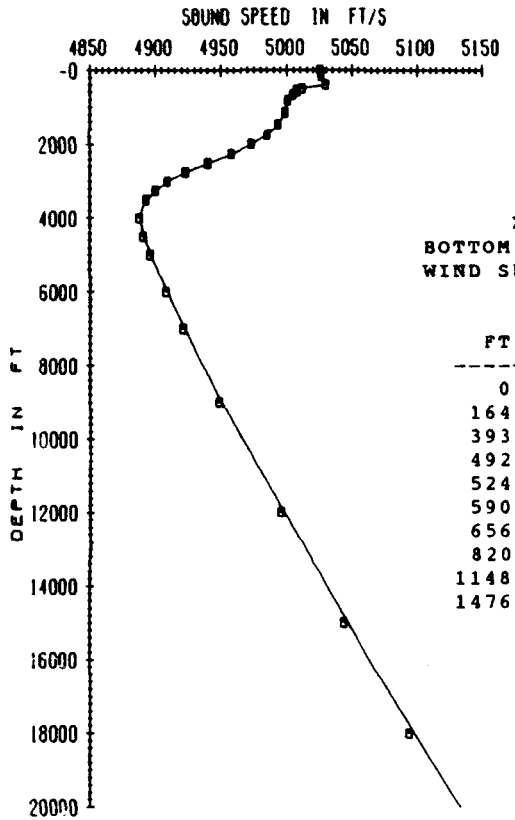


XBT POSITION : 27-53N, 77-05.4W
BOTTOM DEPTH = 3600. FT, BOTTOM PROVINCE = 4
WIND SPEED = 30. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5022.9	2750.	4923.
311.7	5027.2	3000.	4909.
360.9	5026.4	3250.	4900.
459.3	5012.5	3500.	4893.
590.6	5008.4	4000.	4888.
656.2	5003.2	4500.	4891.
820.2	4999.4	5000.	4896.
1148.3	4998.2	6000.	4908.
1476.4	4994.9	7000.	4921.
1804.5	4986.4	9000.	4949.
2132.5	4966.7	12000.	4995.
2460.6	4941.9	15000.	5044.
		18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, CLOVER INSITU AT 1830Z DAY 046

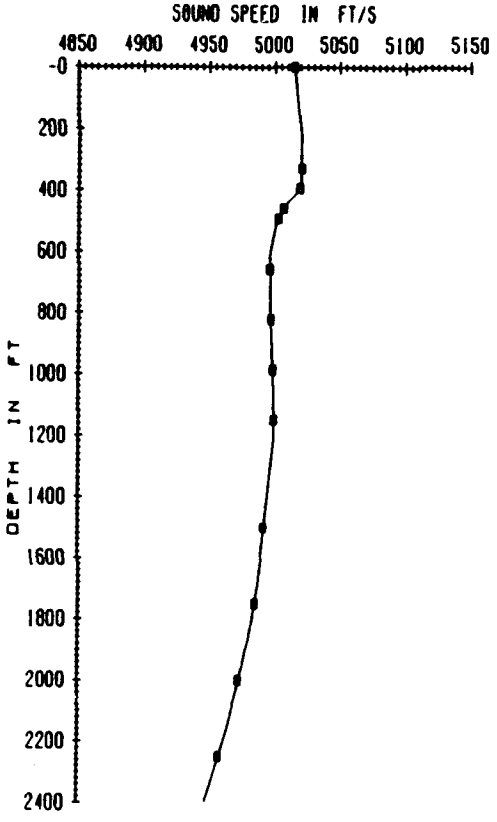


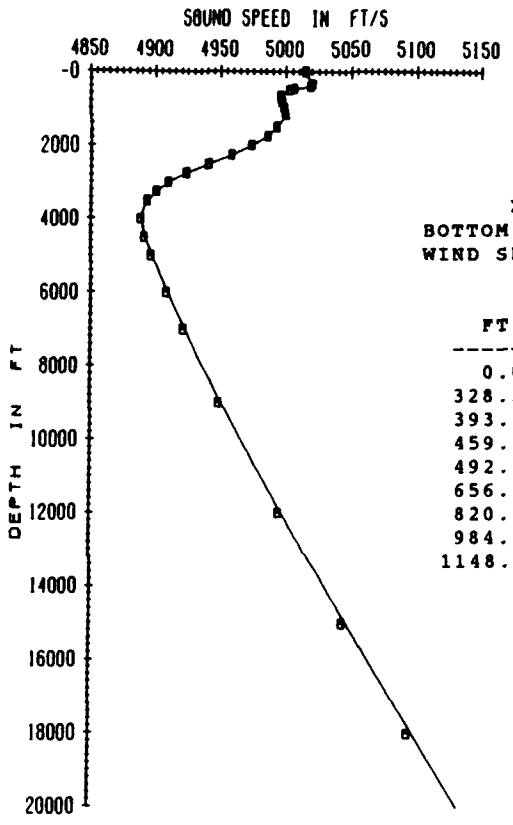


XBT POSITION : 27-41N, 78-01.6W
BOTTOM DEPTH = 3600. FT, BOTTOM PROVINCE = 4
WIND SPEED = 33. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5024.6	1750.	4985.
164.0	5025.6	2000.	4973.
393.7	5029.4	2250.	4958.
492.1	5011.3	2500.	4940.
524.9	5007.4	2750.	4923.
590.6	5007.5	3000.	4909.
656.2	5004.1	3250.	4900.
820.2	5000.3	3500.	4893.
1148.3	4998.2	4000.	4888.
1476.4	4993.0	4500.	4891.
		5000.	4896.
		6000.	4908.
		7000.	4921.
		9000.	4949.
		12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, GLOVER
INSITU AT 0030Z DAY 048

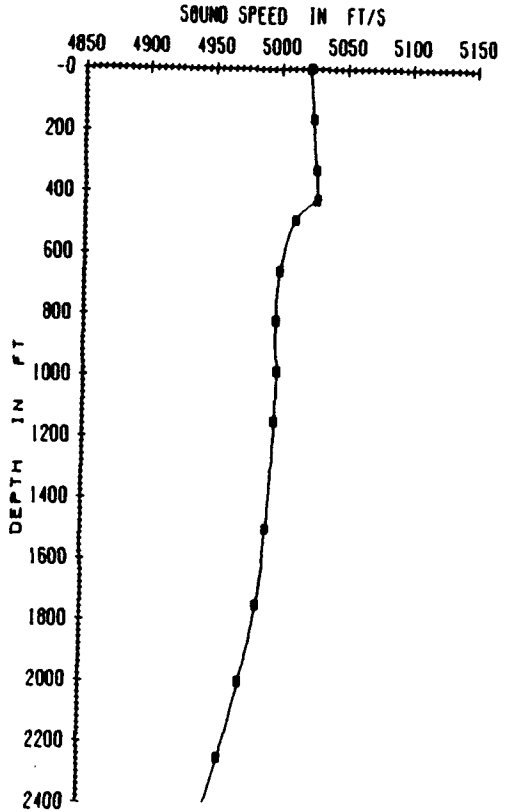


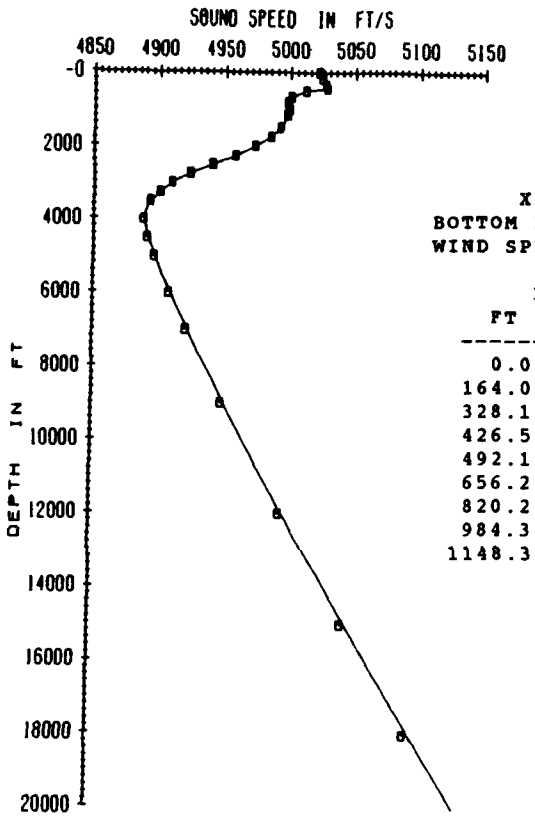


XBT POSITION : 27-19.4N, 75-41.3W
BOTTOM DEPTH = 15650. FT, BOTTOM PROVINCE = 5
WIND SPEED = 24. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5014.5	1500.	4992.
328.1	5019.9	1750.	4985.
393.7	5018.4	2000.	4973.
459.3	5006.3	2250.	4958.
492.1	5002.3	2500.	4940.
656.2	4995.8	2750.	4923.
820.2	4996.6	3000.	4909.
984.3	4998.3	3250.	4900.
1148.3	4999.1	3500.	4893.
		4000.	4888.
		4500.	4891.
		5000.	4896.
		6000.	4908.
		7000.	4921.
		9000.	4949.
		12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, GLOVER INSITU AT 0320Z DAY 048

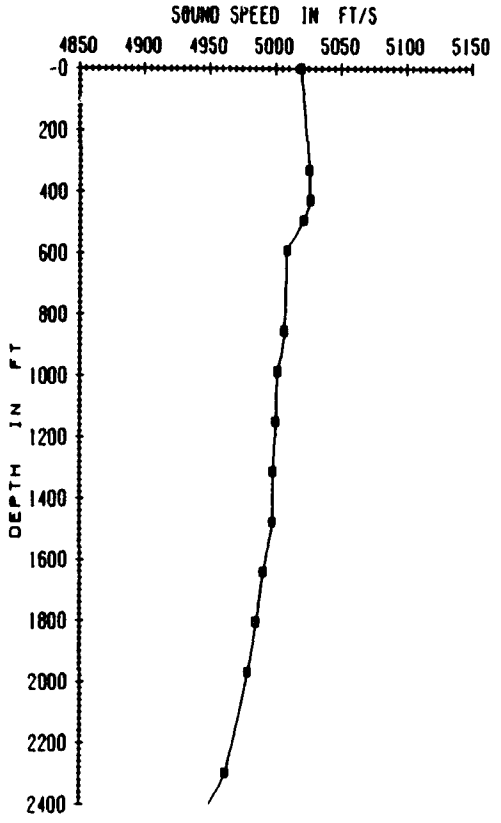


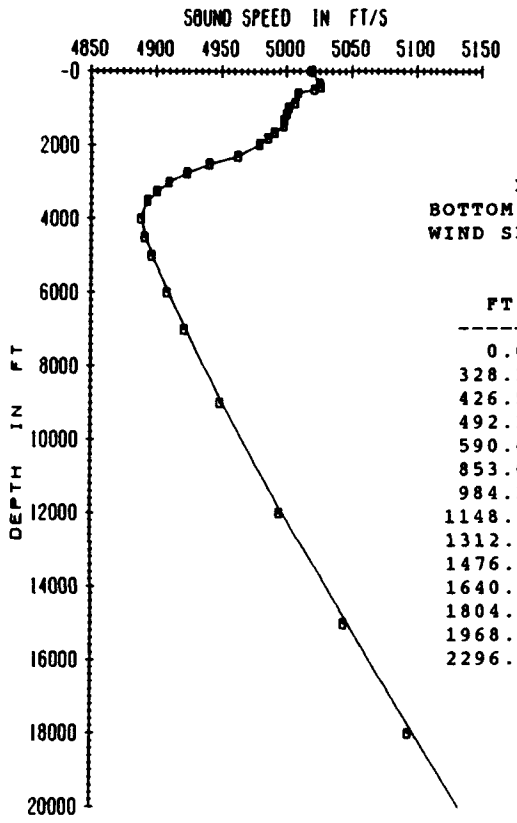


XBT POSITION : 27-52.5N, 75-40.7W
BOTTOM DEPTH = 15600. FT, BOTTOM PROVINCE = 5
WIND SPEED = 15. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5021.3	1500.	4992.
164.0	5024.0	1750.	4985.
328.1	5026.7	2000.	4973.
426.5	5027.4	2250.	4958.
492.1	5011.3	2500.	4940.
656.2	5000.4	2750.	4923.
820.2	4997.5	3000.	4909.
984.3	4998.3	3250.	4900.
1148.3	4997.2	3500.	4893.
		4000.	4888.
		4500.	4891.
		5000.	4896.
		6000.	4908.
		7000.	4921.
		9000.	4949.
		12000.	4995.
		15000.	5044.
		18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, GLOVER
INSITU AT 0950Z DAY 048

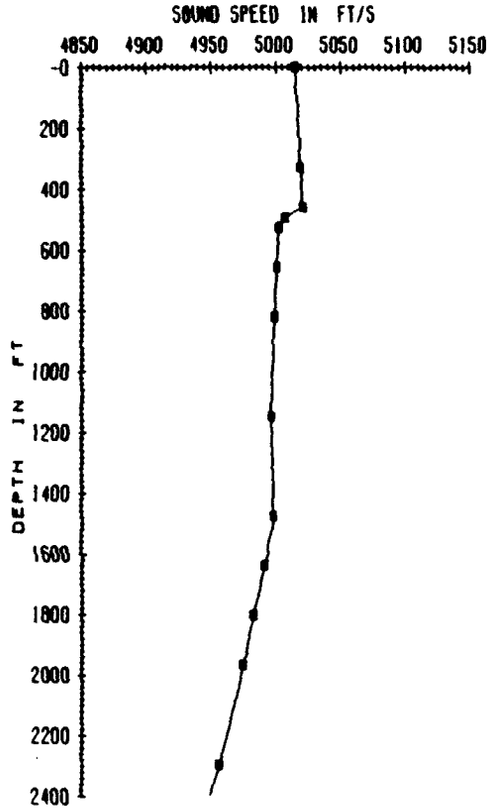


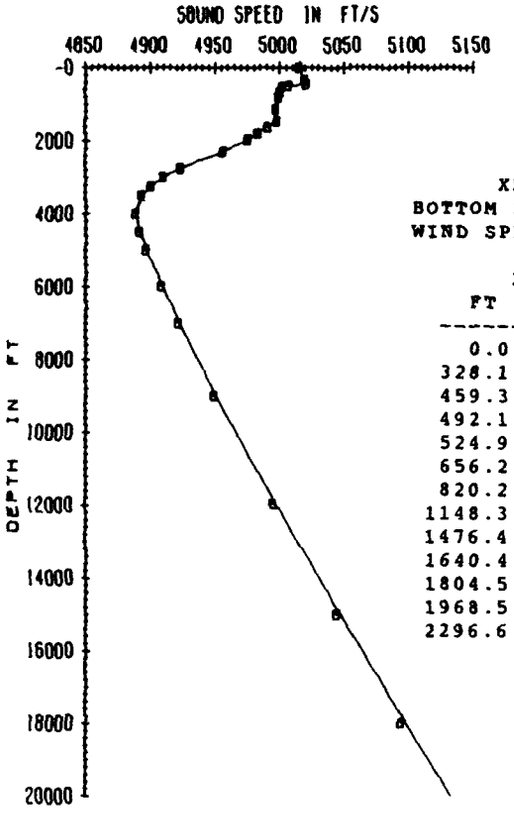


XBT POSITION : 27-25.9N, 75-55.1W
BOTTOM DEPTH = 15400. FT, BOTTOM PROVINCE = 5
WIND SPEED = 18. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5018.8	2500.	4940.
328.1	5025.0	2750.	4923.
426.5	5025.8	3000.	4909.
492.1	5020.9	3250.	4900.
590.6	5008.4	3500.	4893.
853.0	5006.4	4000.	4888.
984.3	5001.2	4500.	4891.
1148.3	5000.1	5000.	4896.
1312.3	4998.0	6000.	4908.
1476.4	4997.8	7000.	4921.
1640.4	4990.7	9000.	4949.
1804.5	4985.4	12000.	4995.
1968.5	4978.8	15000.	5044.
2296.6	4961.8	18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, CLOVER
INSITU AT 1525Z DAY 048

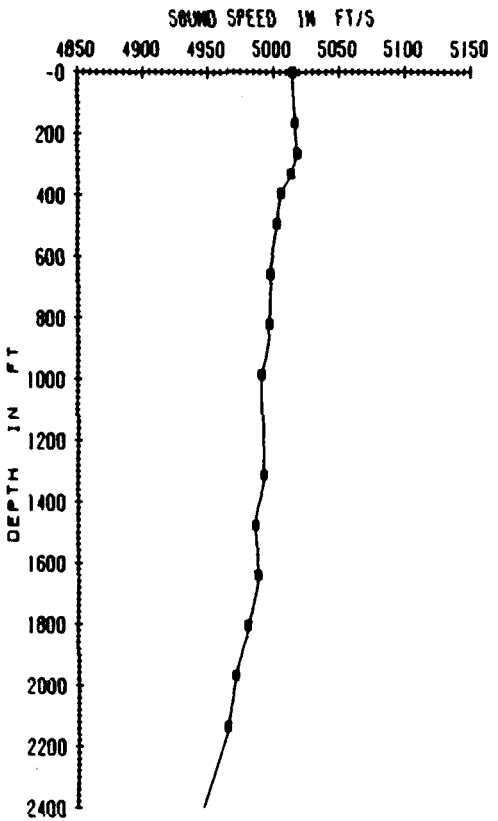


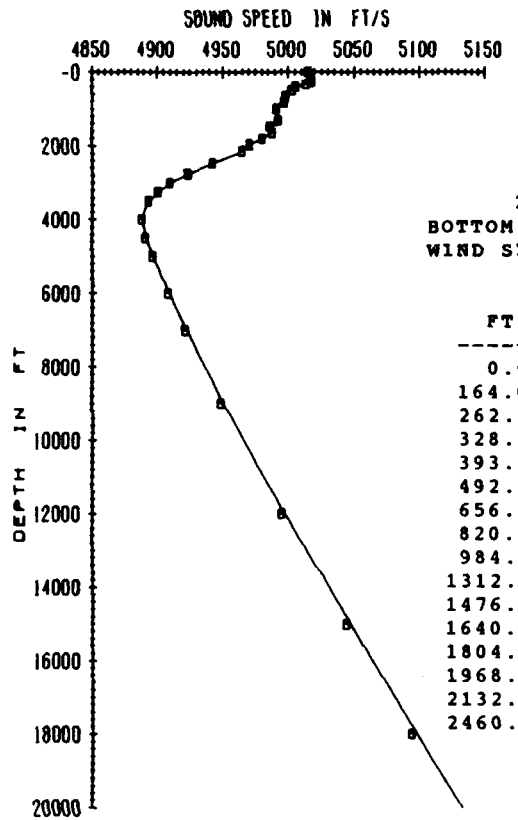


XBT POSITION : 28-13.6N, 75-47.6W
BOTTOM DEPTH = 15400. FT, BOTTOM PROVINCE = 5
WIND SPEED = 7. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5014.5	2750.	4923.
328.1	5019.0	3000.	4909.
459.3	5020.3	3250.	4900.
492.1	5006.8	3500.	4893.
524.9	5001.9	4000.	4888.
656.2	5000.4	4500.	4891.
820.2	4998.5	5000.	4896.
1148.3	4996.3	6000.	4908.
1476.4	4997.8	7000.	4921.
1640.4	4990.7	9000.	4949.
1804.5	4982.3	12000.	4995.
1968.5	4974.6	15000.	5044.
2296.6	4956.2	18000.	5094.
		21000.	5146.

SOUND SPEED PROFILE, GLOVER INSITU AT 2000Z DAY 048

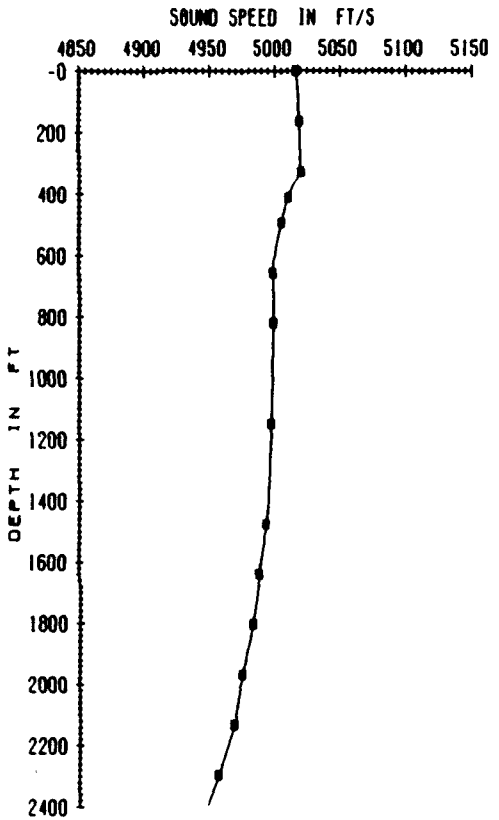


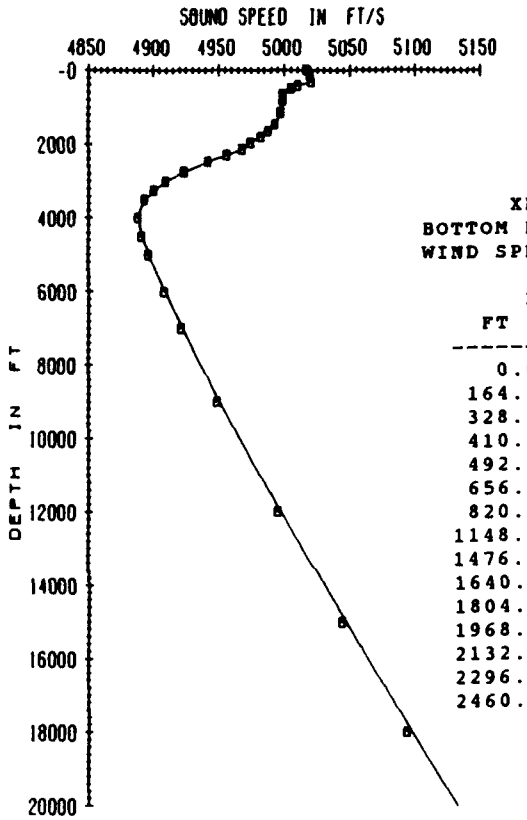


XBT POSITION : 28-9.2N, 76-15.8W
BOTTOM DEPTH = 15000. FT, BOTTOM PROVINCE = 5
WIND SPEED = 4. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5014.5	2750.	4923.
164.0	5016.4	3000.	4909.
262.5	5018.0	3250.	4900.
328.1	5013.0	3500.	4893.
393.7	5005.2	4000.	4888.
492.1	5002.3	4500.	4891.
656.2	4997.6	5000.	4896.
820.2	4996.6	6000.	4908.
984.3	4990.7	7000.	4921.
1312.3	4992.2	9000.	4949.
1476.4	4986.0	12000.	4995.
1640.4	4987.7	15000.	5044.
1804.5	4980.3	18000.	5094.
1968.5	4970.4	21000.	5146.
2132.5	4964.5		
2460.6	4941.9		

SOUND SPEED PROFILE, GLOVER INSITU AT 0000Z DAY 049

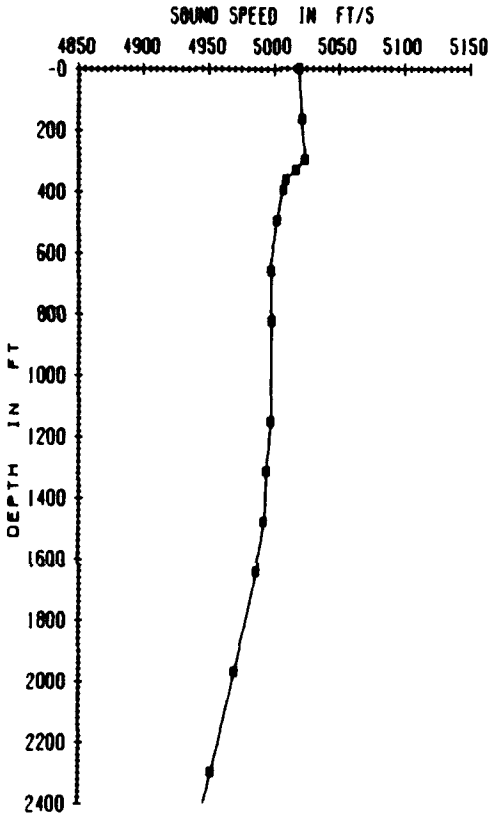


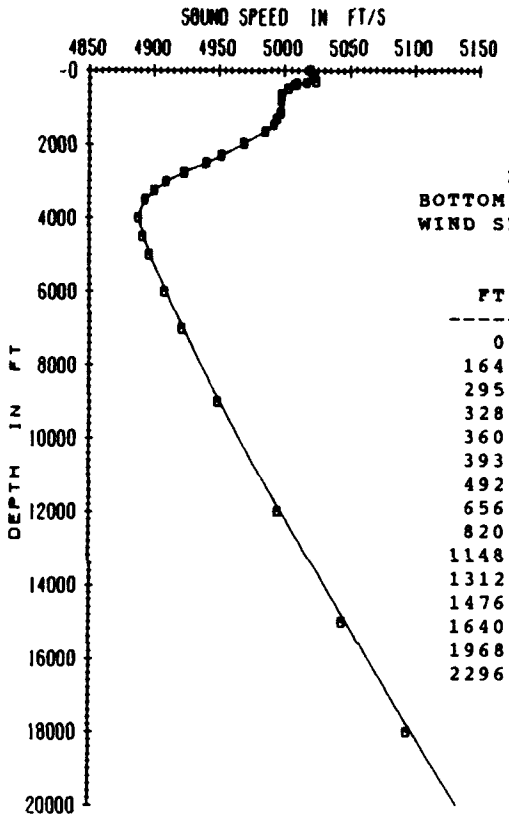


XBT POSITION : 28-2?.2N, 76-54.6W
BOTTOM DEPTH = 3800. FT, BOTTOM PROVINCE = 4
WIND SPEED = 10. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5016.2	2750.	4923.
164.0	5018.9	3000.	4909.
328.1	5019.9	3250.	4900.
410.1	5009.9	3500.	4893.
492.1	5005.0	4000.	4888.
656.2	4998.6	4500.	4891.
820.2	4998.5	5000.	4896.
1148.3	4997.2	6000.	4908.
1476.4	4993.0	7000.	4921.
1640.4	4987.7	9000.	4949.
1804.5	4982.3	12000.	4995.
1968.5	4974.6	15000.	5044.
2132.5	4967.8	18000.	5094.
2296.6	4956.2	21000.	5146.
2460.6	4941.9		

SOUND SPEED PROFILE, GLOVER
INSITU AT 0315Z DAY 049

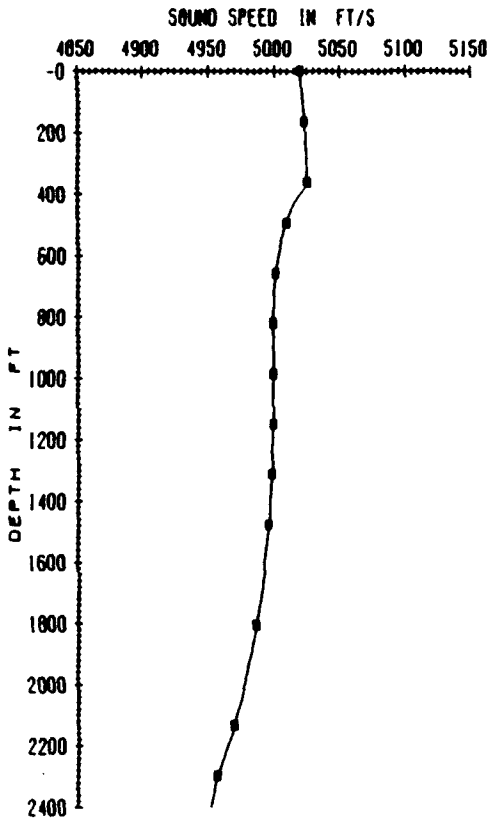


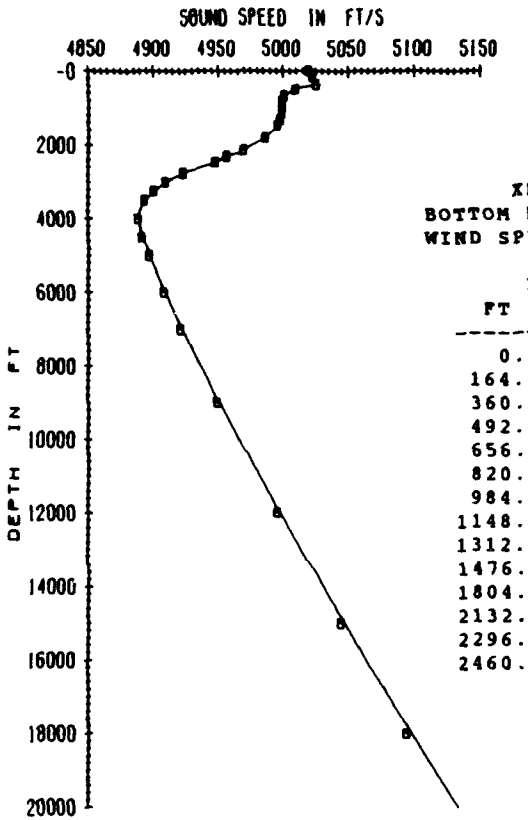


XBT POSITION : 28-22.7N, 77-08.7W
BOTTOM DEPTH = 3600. FT, BOTTOM PROVINCE = 4
WIND SPEED = 10. KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5018.8	2500.	4940.
164.0	5021.4	2750.	4923.
295.3	5023.6	3000.	4909.
328.1	5016.5	3250.	4900.
360.9	5009.1	3500.	4893.
393.7	5007.0	4000.	4888.
492.1	5002.3	4500.	4891.
656.2	4997.6	5000.	4896.
820.2	4997.5	6000.	4908.
1148.3	4997.2	7000.	4921.
1312.3	4994.2	9000.	4949.
1476.4	4992.0	12000.	4995.
1640.4	4985.7	15000.	5044.
1968.5	4969.3	18000.	5094.
2296.6	4951.7	21000.	5146.

SOUND SPEED PROFILE, GLOVER INSITU AT 0715Z DAY 049

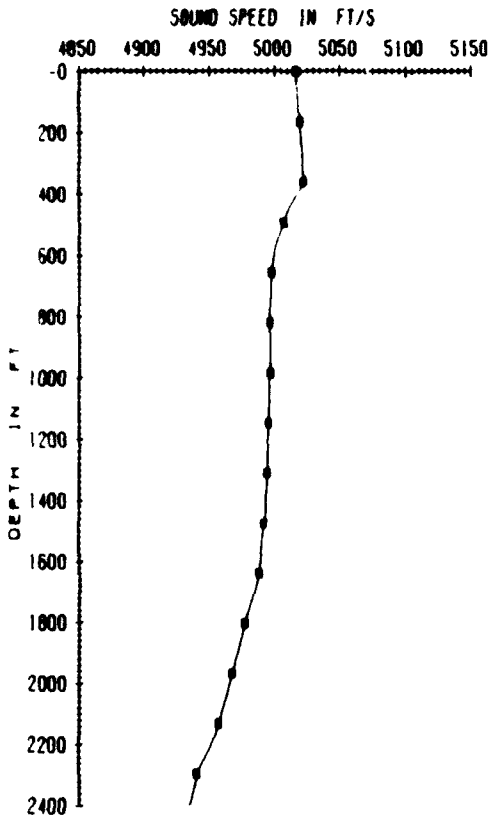


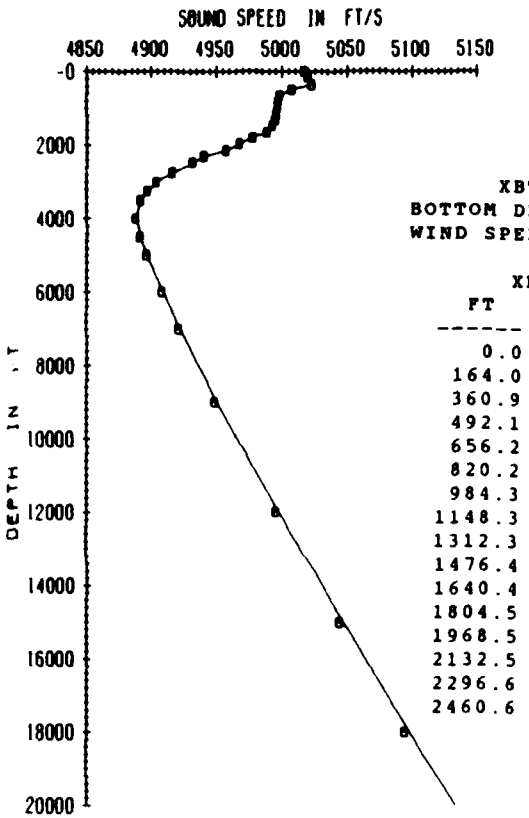


XBT POSITION : 28-05.9N, 77-44.8W
BOTTOM DEPTH = 3600. FT, BOTTOM PROVINCE = 4
WIND SPEED = 15.5 KNOTS, MERGED WITH PODESZWA A16

XBT DATA		PODESZWA DATA	
FT	FT/S	FT	FT/S
0.0	5019.6	2750.	4923.
164.0	5022.3	3000.	4909.
360.9	5024.7	3250.	4900.
492.1	5008.6	3500.	4893.
656.2	5000.4	4000.	4888.
820.2	4998.5	4500.	4891.
984.3	4998.3	5000.	4896.
1148.3	4998.2	6000.	4908.
1312.3	4997.1	7000.	4921.
1476.4	4994.9	9000.	4949.
1804.5	4985.4	12000.	4995.
2132.5	4968.8	15000.	5044.
2296.6	4956.2	18000.	5094.
2460.6	4947.6	21000.	5146.

SOUND SPEED PROFILE, GLOVER INSITU AT 1115Z DAY 049





XBT POSITION : 28-44.8N, 78-14.6W
BOTTOM DEPTH = 3700. FT, BOTTOM PROVINCE = 4
WIND SPEED = 16.5 KNOTS, MERGED WITH PODESZWA A15

XBT DATA FT	XBT DATA FT/S	PODESZWA DATA FT	PODESZWA DATA FT/S
0.0	5016.2	2750.	4916.
164.0	5018.9	3000.	4904.
360.9	5022.1	3250.	4897.
492.1	5006.8	3500.	4892.
656.2	4997.6	4000.	4888.
820.2	4996.6	4500.	4891.
984.3	4996.4	5000.	4896.
1148.3	4995.3	6000.	4908.
1312.3	4994.2	7000.	4921.
1476.4	4992.0	9000.	4949.
1640.4	4987.7	12000.	4995.
1804.5	4977.2	15000.	5044.
1968.5	4967.2	18000.	5094.
2132.5	4956.9	21000.	5146.
2296.6	4940.3		
2460.6	4931.3		

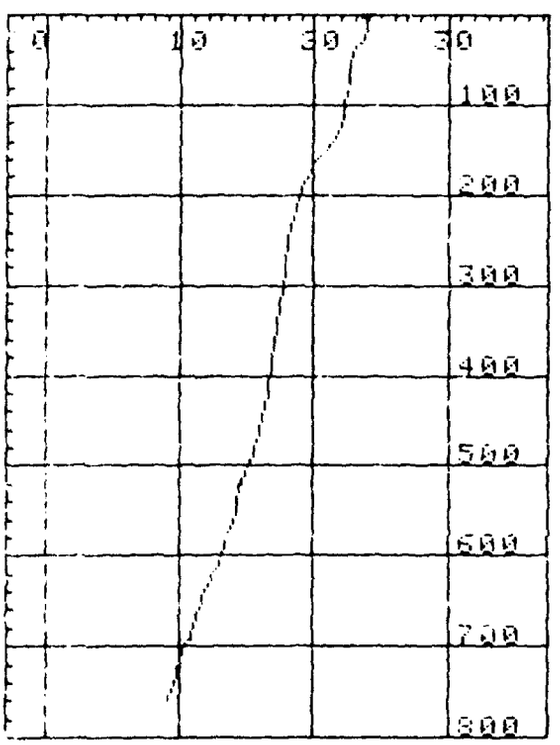
APPENDIX B

R/V Range Rover Temperature Profiles

Ship R/V RANGE ROVER
Cruise SWI-T2
Probe T-7 ID 1
LAT 27-45N
LON 078-12W
JDay 31 GMT 0620

sfc. bkt. Temp = 24.4°C

degree C vs Meters



Tape #1

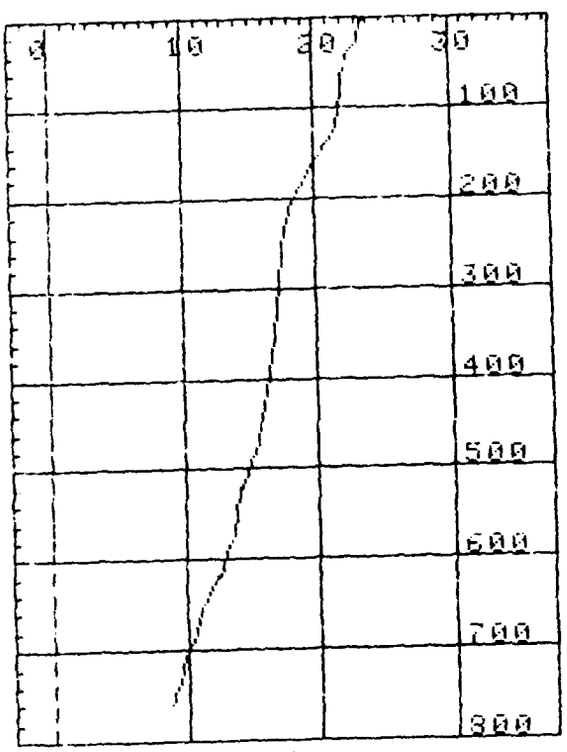
xbt #1

CAT NAME	TYPE	BYTES	RECS	FILE
TEST1	DATA	256	24	1
TEST2	DATA	256	24	2
1	DATA	256	43	3

Ship R/V RANGE ROVER
Cruise SWI-T2
Probe T-7 ID 2
LAT 27-48N
LON 078-18W
JDay 31 GMT 1026

sfc. bkt. Temp = 24.4°C

degree C vs Meters

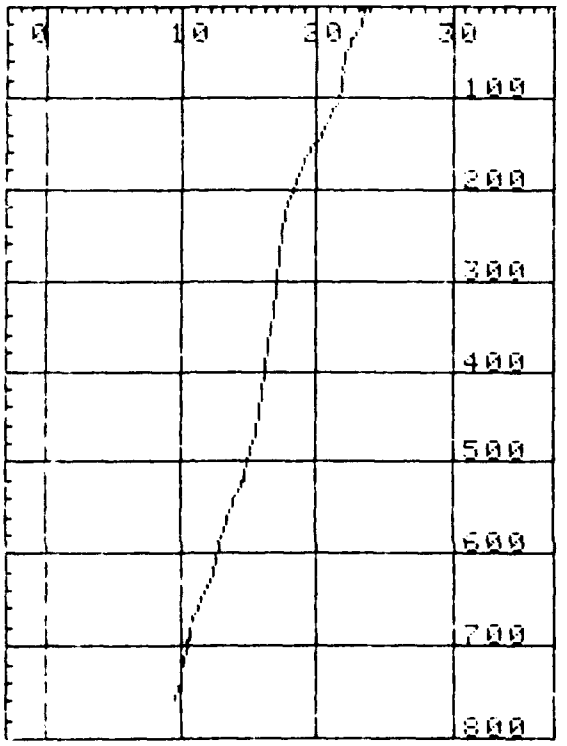


CAT NAME	TYPE	BYTES	RECS	FILE
TEST1	DATA	256	24	1
TEST2	DATA	256	24	2
1	DATA	256	43	3
2	DATA	256	43	4

ip R/V RANGE ROVER
uise:SW1-T2
obe:T-7 ID:3
T:27-44N
n:078-12W
e: 031 GMT: ~~0027~~ 1513Z

bKT. Temp = 24.6°C

degree C vs Meters



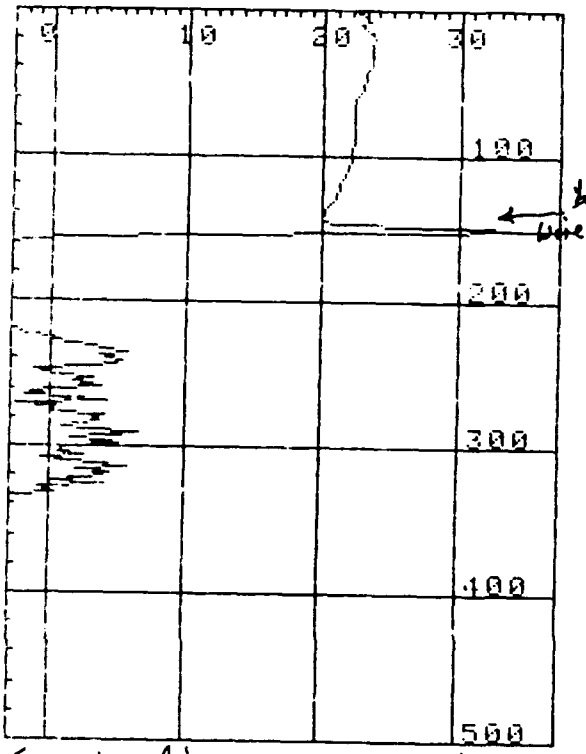
Rcd'd on File 5 Tape II

Ship R/V RANGE ROVER
Cruise:SW1-T2
Probe:T-4 ID:4
LAT:27-46.7N
LON:077-52.5W
JDay: 39 GMT: 2009

NOT SAVED.

sfc. bKT. Temp = 24.6°C

degree C vs Meters

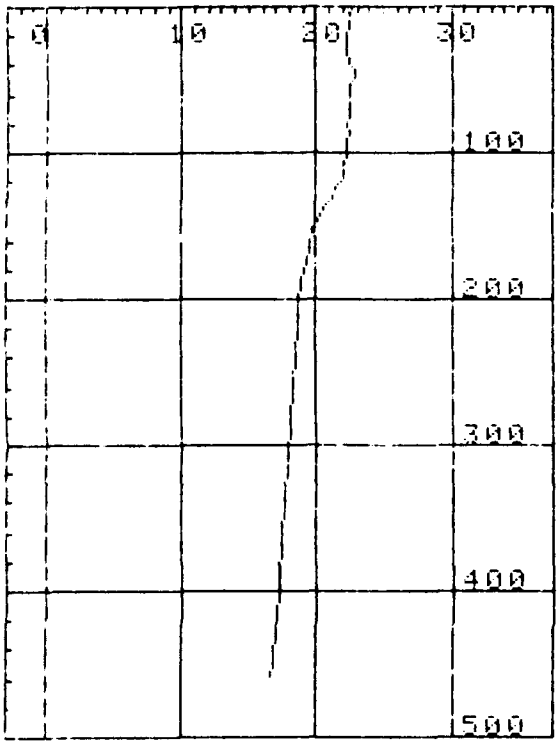


bad (wire break) - NOT saved

Ship R/V RANGE ROVER
Cruise SW1-T2
Probe T-4 ID 5
LAT 27-46.7N
LON 077-52.5W
JDay 39 GMT 2015

bkt. Temp. ~24.4°C

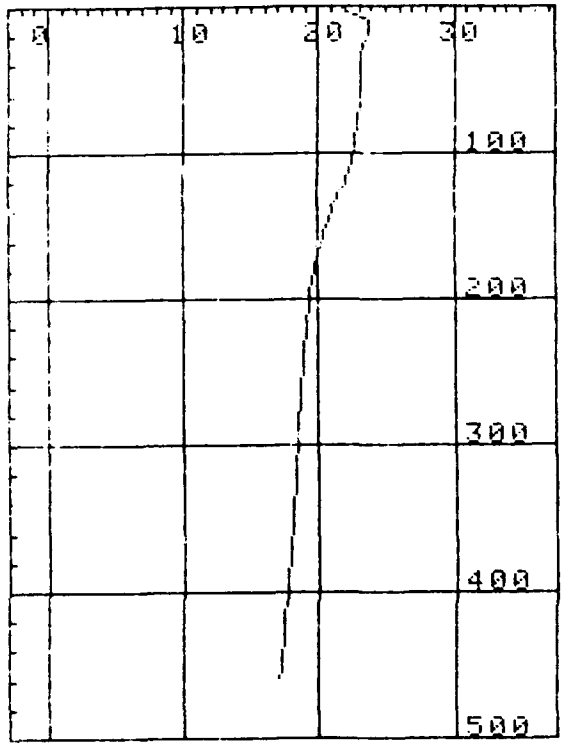
degree C vs Meters



Ship R/V RANGE ROVER
Cruise SW1-T2
Probe T-4 ID 6
LAT 27-47N
LON 077-03W
JDay 32 GMT 0139

bkt. Temp = 23.9°C

degree C vs Meters



AT

NAME	TYPE	BYTES	RECS	FILE
TEST1	DATA	256	24	1
TEST2	DATA	256	24	2
	DATA	256	43	3
	DATA	256	43	4
	DATA	256	43	5
	DATA	256	24	6

NOT US

CAT

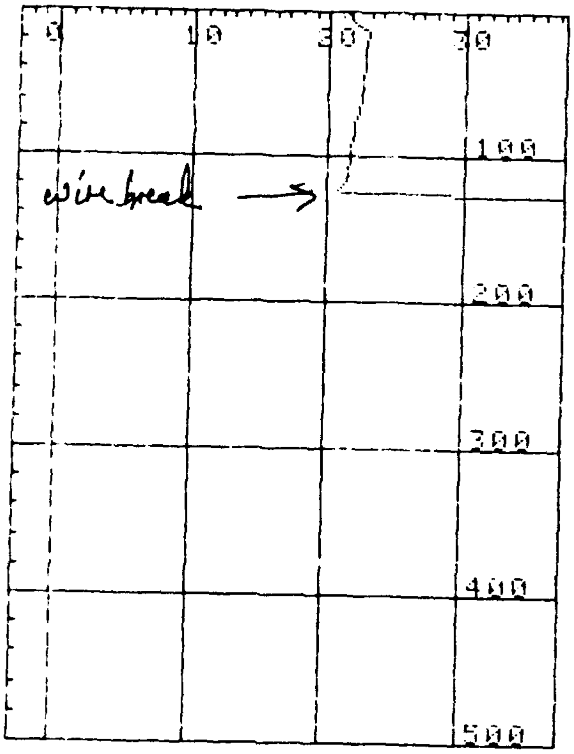
NAME	TYPE	BYTES	RECS	FILE
TEST1	DATA	256	24	1
TEST2	DATA	256	24	2
1	DATA	256	43	3
2	DATA	256	43	4
3	DATA	256	43	5
5	DATA	256	24	6
6	DATA	256	24	7

TM No 911037

hip:R/V RANGE ROVER
ruise:SW1-T2
robe:T-4 ID:7
AT:27-52.07N
ON:077-04.91W
Day: 32 GMT: 0524

9 knots
surface = 23.7°C

degree C vs Meters



ave d

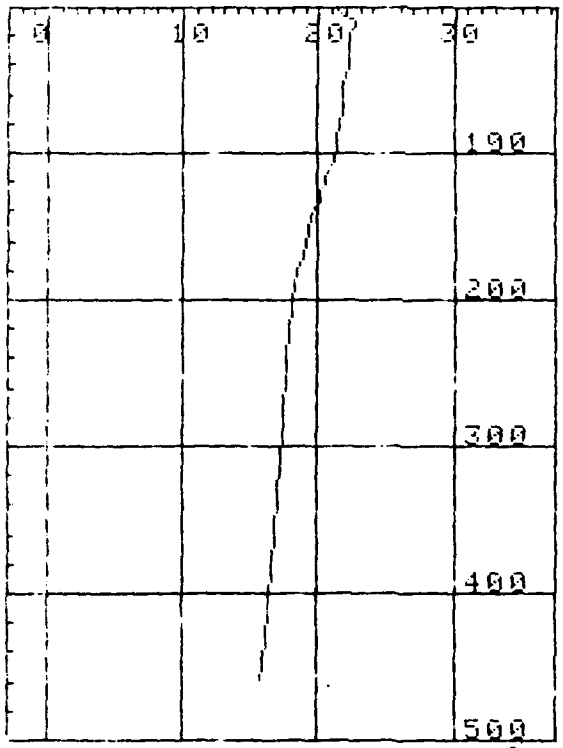
~~A,A7,B,2,K,3,J,U,H1,M1,E4,M2~~
~~3 ENABLE KBD 169~~
~~30 CONTROL 7,16 ; 128~~
~~10 ABORTIO 7~~
~~20 SET TIMEOUT 7;3000~~
AT

AME	TYPE	BYTES	RECS	FILE
EST1	DATA	256	24	1
EST2	DATA	256	24	2
	DATA	256	43	3
	DATA	256	43	4
	DATA	256	43	5
	DATA	256	24	6
	DATA	256	24	7
	DATA	256	24	8 ←

sfc. 6 Kt. Temp = 24.0°C

Ship:R/V RANGE ROVER
Cruise:SW1-T2
Probe:T-4 ID:8
LAT 27-41N
LON 077-34W
JDay: 32 GMT: 1005

degree C vs Meters



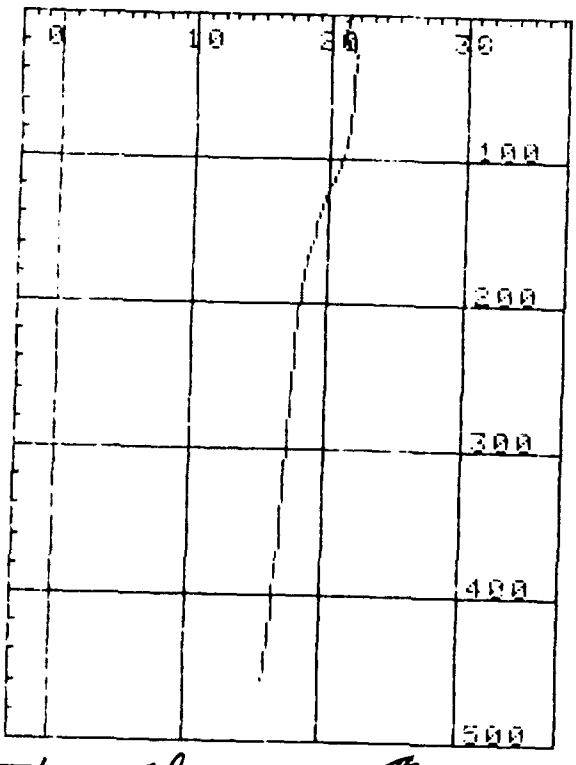
surface Temp = 24°C

CAT

NAME	TYPE	BYTES	RECS	FILE
TEST1	DATA	256	24	1
TEST2	DATA	256	24	2
1	DATA	256	43	3
2	DATA	256	43	4
3	DATA	256	43	5
5	DATA	256	24	6
6	DATA	256	24	7
7	DATA	256	24	8
8	DATA	256	24	9 ←

Ship R/V RANGE ROVER
Cruise:SW1-T2
Probe:T-4 ID:9
LAT:27-45.5N
LON:077-36.8W
JDay: 32 GMT: 1317

degree C vs Meters

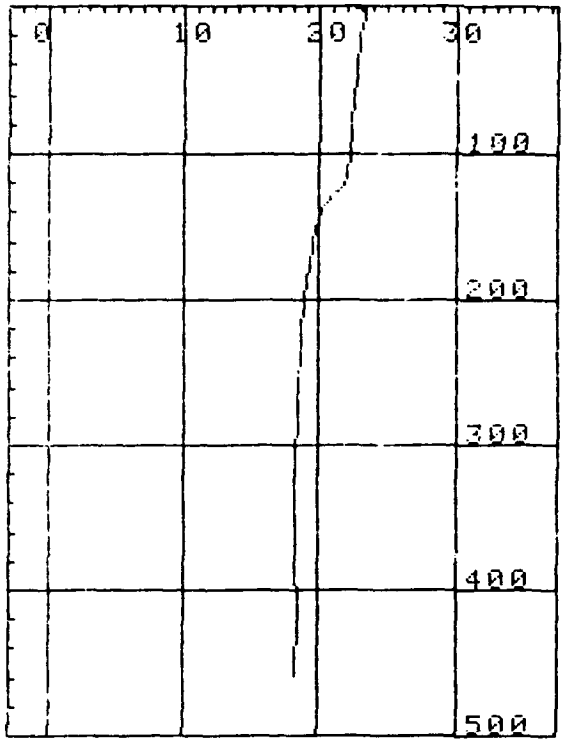


SAVed as File 10 - Type 4

Ship R/V RANGE ROVER
Cruise:SW1-T2
Probe:T-4 ID:10
LAT:27-41.6N
LON:076-37.5W
JDay: 32 GMT: 2216

Sfc. Temp 23.1°C

degree C vs Meters



CAT

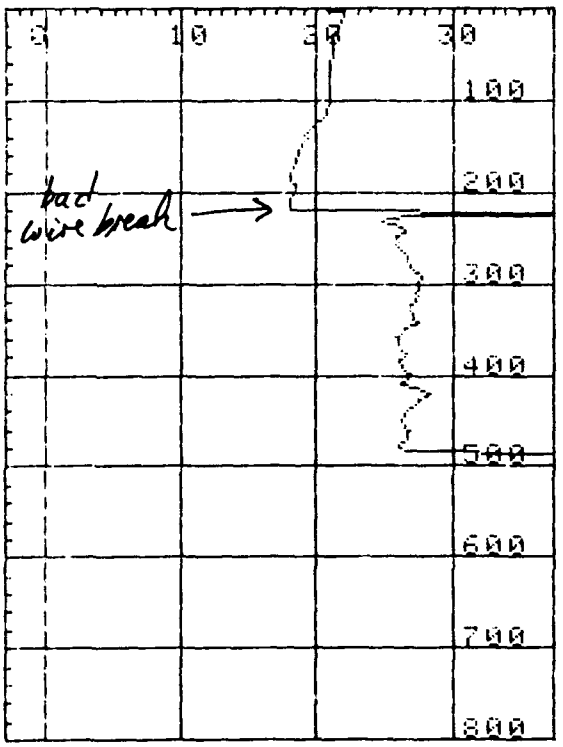
NAME	TYPE	BYTES	RECS	FILE
TEST1	DATA	256	24	1
TEST2	DATA	256	24	2
1	DATA	256	43	3
2	DATA	256	43	4
3	DATA	256	43	5
5	DATA	256	24	6
6	DATA	256	24	7
7	DATA	256	24	8
8	DATA	256	24	9
9	DATA	256	24	10
10	DATA	256	24	11

not saved

Ship R/V RANGE ROVER
Cruise:SW1-T2
Probe:T-7 ID:11
LAT:27-41.6N
LON:076-37.5W
JDay: 33 GMT: 0203

~20°C

degree C vs Meters

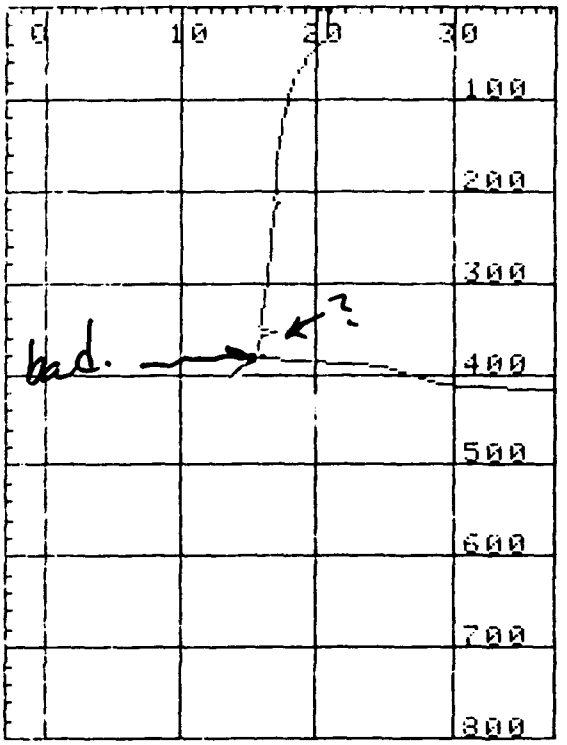


not saved (wire break)

TM No 911037
Ship R/V RANGE ROVER
Cruise:SW1-T2
Probe:T-7 ID:12
LAT:27-41.6N
LON:076-37.5W
JDay: 33 GMT: 0211

Sfc. bkt. Temp = 22.8°

degree C vs Meters



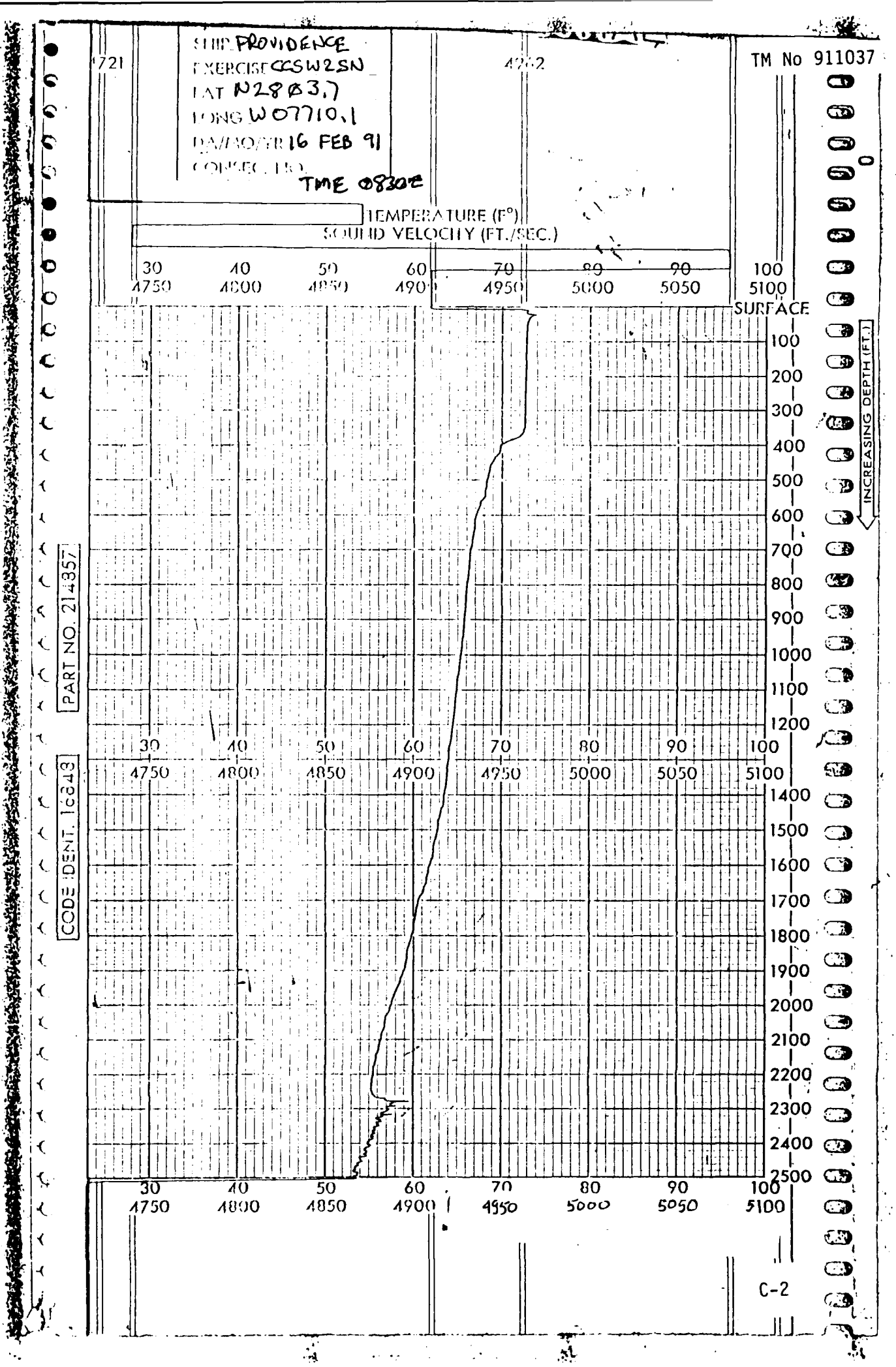
CAT

NAME	TYPE	BYTES	RECS	FILE
TEST1	DATA	256	24	1
TEST2	DATA	256	24	2
1	DATA	256	43	3
2	DATA	256	43	4
3	DATA	256	43	5
5	DATA	256	24	6
6	DATA	256	24	7
7	DATA	256	24	8
8	DATA	256	24	9
9	DATA	256	24	10
10	DATA	256	24	11
12	DATA	256	43	12

- last xbt drop on R/V Range Rover for this Test IK.

APPENDIX C

USS Providence Temperature Profiles


SHIP PROVIDENCE
EXERCISE CCSW2SN
LAT N2803.7
LONG W07710.1
DA/MO/YR 16 FEB 91
TME 0830Z
TM No 911037
TEMPERATURE (F°)
SOUND VELOCITY (FT./SEC.)
30 40 50 60 70 80 90 100
4750 4800 4850 4900 4950 5000 5050 5100
SURFACE
100 200 300 400 500 600 700 800 900 1000 1100 1200 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500
INCREASING DEPTH (FT.)
PART NO. 214357
CODE IDENT. 1c243
C-2

SHIP 14002
EXERCISE 27-59 N
LAT 028-06 W
LONG
DA/MO/YR 16FEB91
CONSEC. NO.

TM No 911037

4962 5107

TEMP

TEMPERATURE (F°)
SOUND VELOCITY (FT./SEC.)

30 40 50 60 70 80 90 100
4750 4800 4850 4900 4950 5000 5050 5100

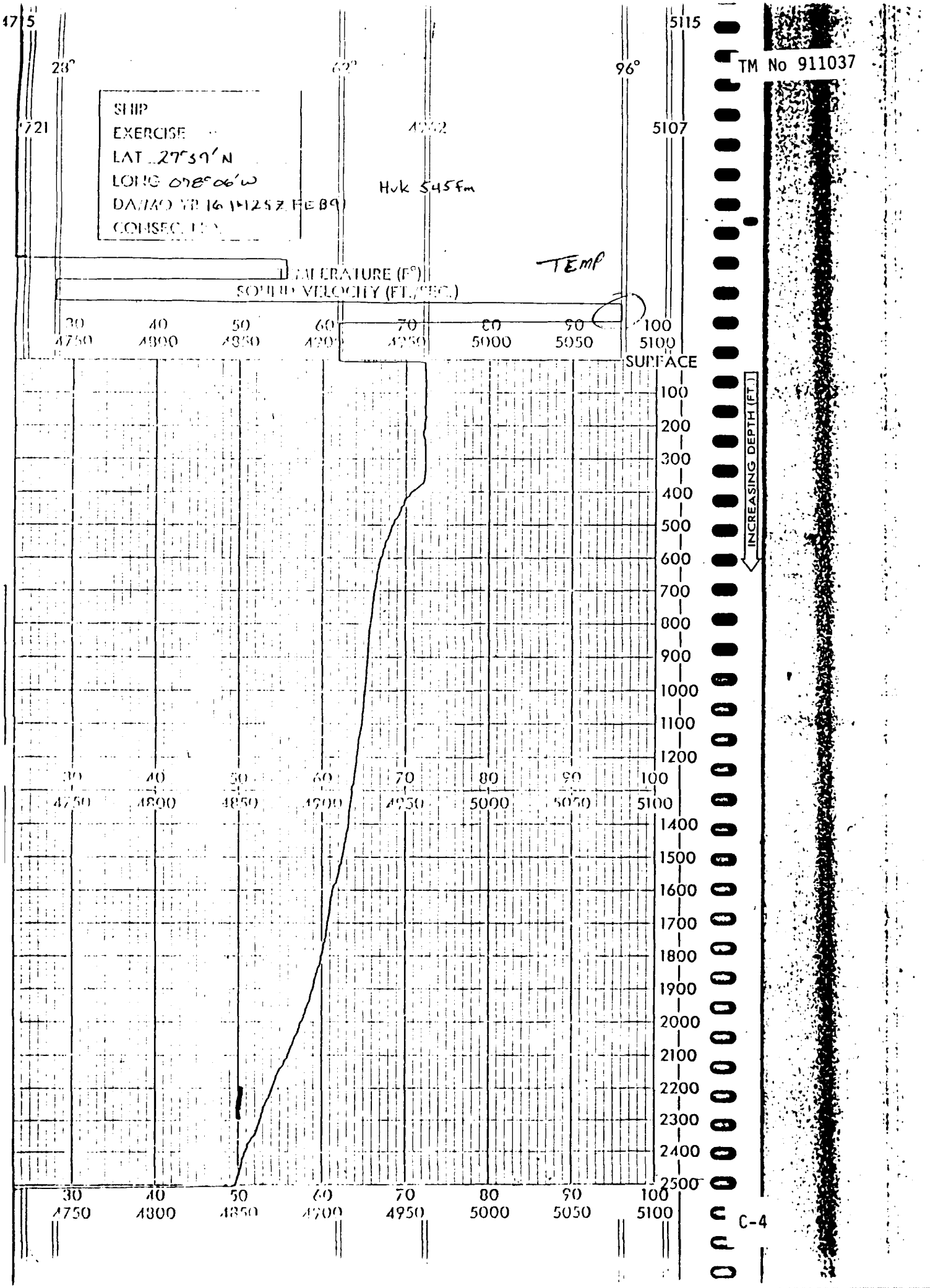
SURFACE
100 200 300 400 500 600 700 800 900 1000 1100 1200 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500

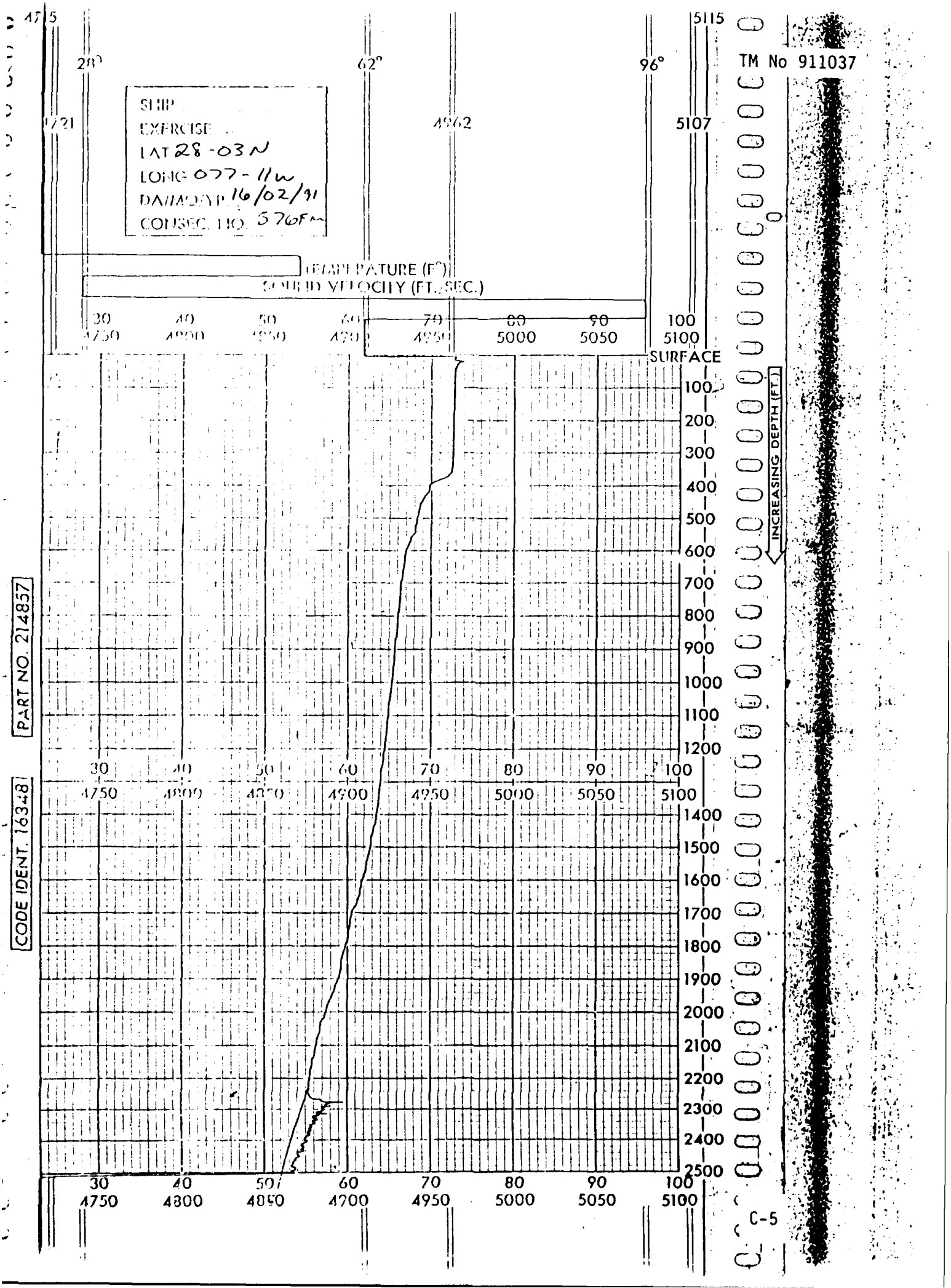
INCREASING DEPTH (FT.)

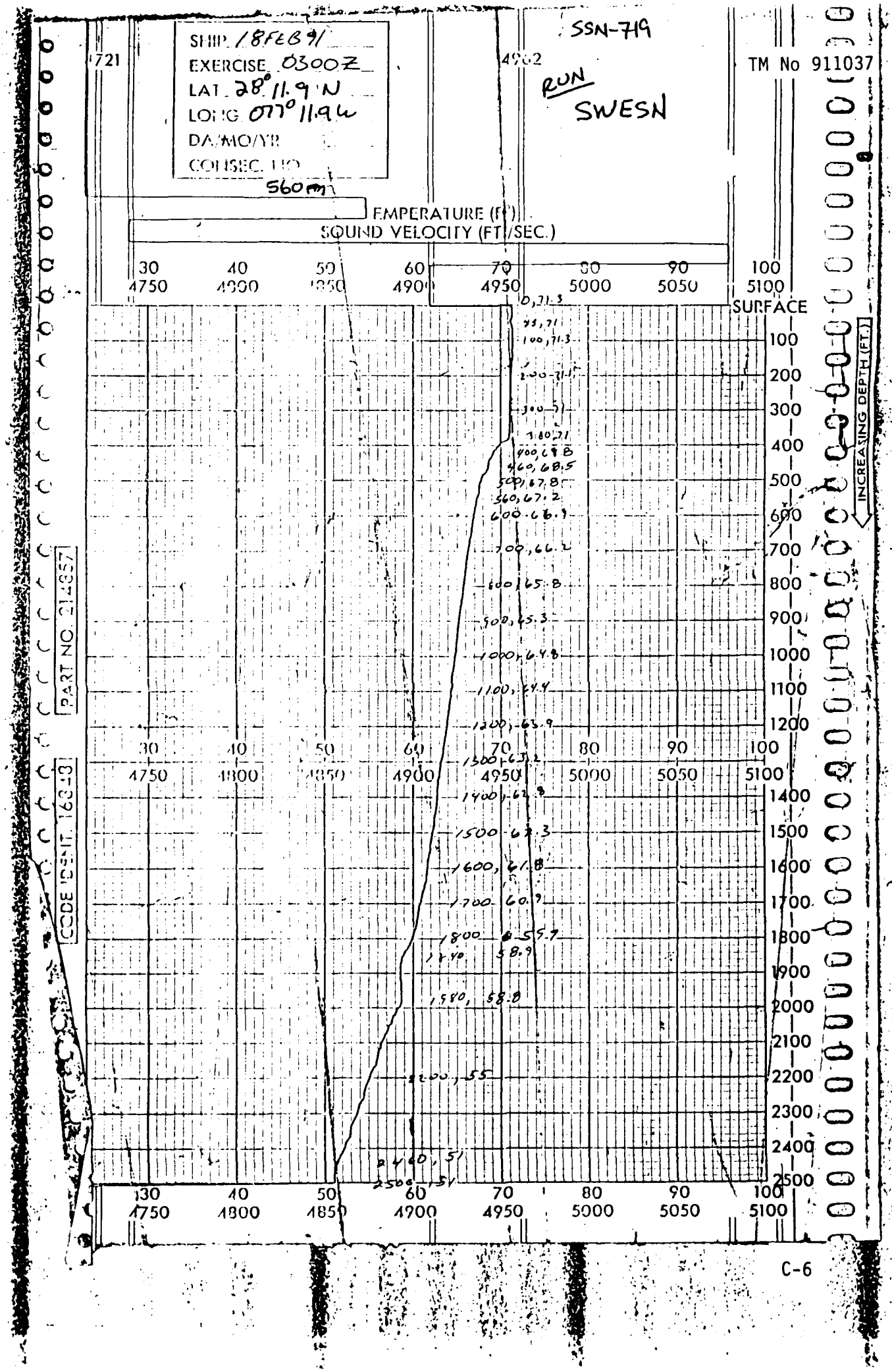
5000

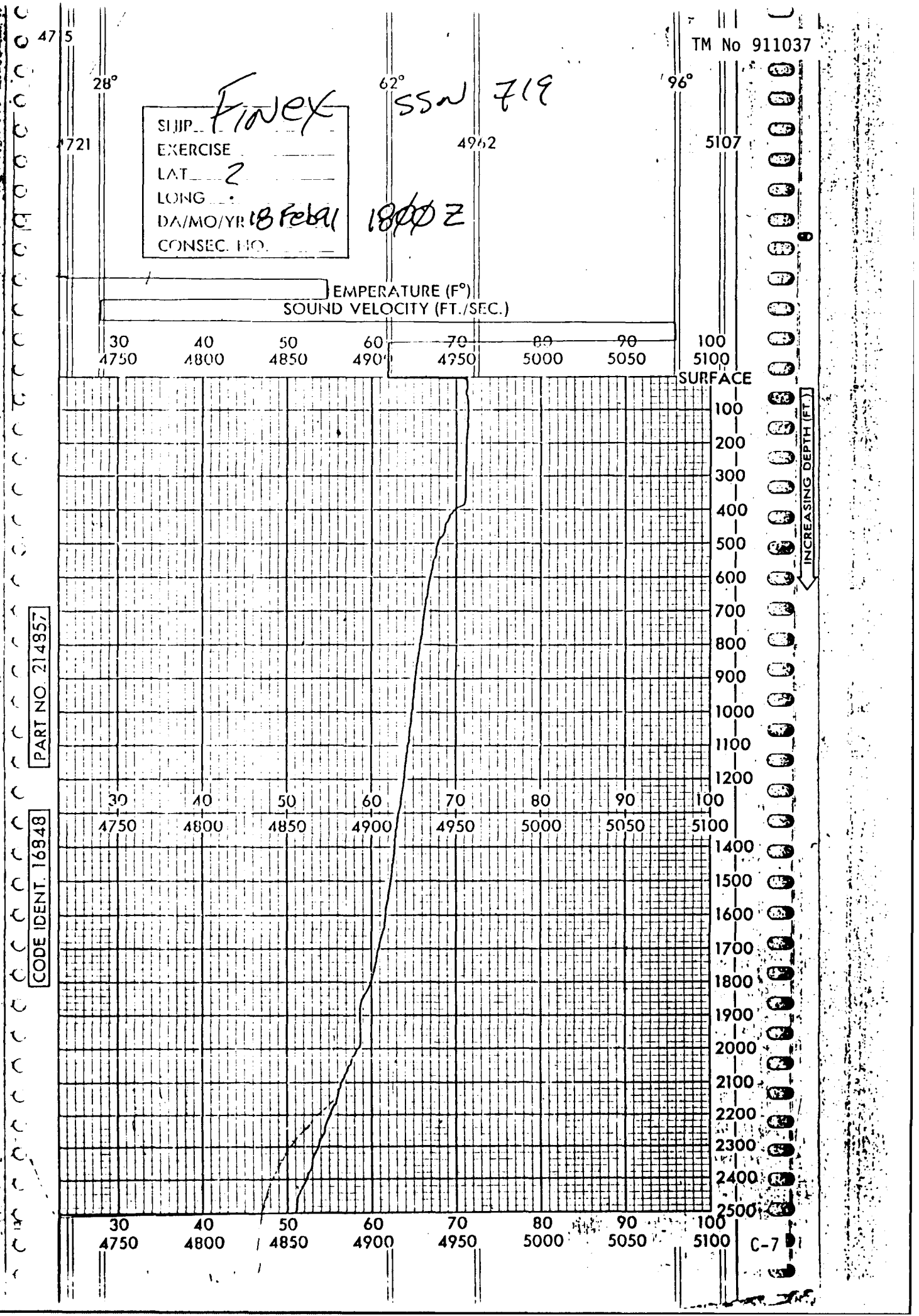
30 40 50 60 70 80 90 100
4750 4800 4850 4900 4950 5000 5050 5100

0 40 50 60 70 80 90 100
50 4800 4850 4900 4950 5000 5050 5100


TM No 911037
SHIP
EXERCISE
LAT 27°39'N
LONG 078°06'W
Hvk 545fm
TEMP
SURFACE
INCREASING DEPTH (FT.)
C-4


TM No 911037
SHIP
EXERCISE
LAT 28-03N
LONG 077-11W
DATE/TYP 16/02/91
CONSEC NO 576FM
TEMPERATURE (F°)
SOUND VELOCITY (FT./SEC.)
SURFACE
INCREASING DEPTH (FT.)
PART NO. 214857
CODE IDENT. 16348
C-5


SSN-719
TM No 911037
SHIP 18FEB91
EXERCISE 0300Z
LAT 28° 11.9 N
LONG 077° 11.9 W
DA/MO/YR
CONSEC. NO
560m
RUN
SWESN
4962
4721
TEMPERATURE (F°)
SOUND VELOCITY (FT/SEC.)
30 40 50 60 70 80 90 100
4750 4800 4850 4900 4950 5000 5050 5100
SURFACE
0,71.3
33,71
100,71.3
200,71.1
300,71
380,71
400,69.8
460,68.5
500,67.8
560,67.2
600,66.9
700,66.2
800,65.8
900,65.3
1000,64.8
1100,64.4
1200,63.9
1300,63.2
1400,62.8
1500,62.3
1600,61.8
1700,60.9
1800,55.7
1900,58.9
1980,58.8
2200,55
2460,51
2500,51
INCREASING DEPTH (FT.)
100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500
PART NO. 214857
CODE IDENT. 16313


TM No 911037
SHIP FINEX SSN 719
EXERCISE
LAT 2
LONG
DA/MO/YR 18 Feb 91 1800 Z
CONSEC. NO.
TEMPERATURE (F°)
SOUND VELOCITY (FT./SEC.)
SURFACE
INCREASING DEPTH (FT.)
PART NO. 214357
CODE IDENT. 16848
C-7

TM No 911037

LONG
DA MOYR
CORRECTED

LAT - 27-49.9 N
LONG - 078-83.9 W

Time: 1846
23462
15 FEB 91

30 40 50 60 70 80 90 100
4750 4800 4850 4900 4950 5000 5050 5100

SURFACE

INCREASING DEPTH (FT.)

100 200 300 400 500 600 700 800 900 1000 1100 1200 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500

PART NO. 214357

CODE IDENT. 16843

C-8